AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 | 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
0003	17-Jun-2003	W26GLG-3107-8937	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than item 6)	CODE
CONTRACTING OFFICE (CA/CW) US ARMY ENGR DIST NORFOLK ATTN: CENAO-SS-C 803 FRONT STREET NORFOLK VA 23510-1096	DACA65	**See Item 6**	

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
	X	9A. AMENDMENT OF SOLICITATION NO. DACA65-03-R-0023
	X	9B. DATED (SEE ITEM 11) 30-Apr-2003
		10A. MOD. OF CONTRACT/ORDER NO.
		10B. DATED (SEE ITEM 13)
CODE / FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer [X] is extended, [ ] is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

[ ] A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

[ ] B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).

[ ] C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

[ ] D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [ ] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

AMENDMENT NO. 0003 to DACA65-03-R-0023, Manuever and Training Equipment SIte (MATES), Fort Pickett, VA.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) TEL: EMAIL:	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED 17-Jun-2003

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

The following items are applicable to this modification:

CONTINUATION

1. PHASE II proposals are due AUGUST 1, 2003 at 11:00 am. Proposals are to be delivered to US Army Engineer District, Norfolk, 803 Front Street, ATTN: CENAO-SS-C/Gray, Norfolk, VA 23510-1096.

2. A preproposal conference is scheduled for June 25, 2003 at Fort Pickett. The conference will commence at 10:00am. Please plan to arrive between 9:45am and 10:00am and sign in at the main facility entrance on Military Road. Please provide an estimated number of attendees to the Pre-Proposal conference to me not later than 12:00pm on June 23, 2003 (via fax at 757-441-7183). The Pre-Proposal conference will include a guided site tour.

3. Section 00010

a. SF 1442, Block 11; ADD: "720".
b. Proposal price schedule is DELETED in its entirety and REPLACED with the attached schedule.

4. Section 00800

a. FAR 52.211-10, Commencement, Prosecution and Completion of Work: ADD: 720 calendar days.
b. FAR 52.211-12, Liquidated Damages: ADD: $2051.00 per day

5. Technical plans and specifications will be amended. Make appropriate changes in accordance with the attached.

MANEUVER AREA TRAINING EQUIPMENT SITE (MATES)

PRE-PROPOSAL INFORMATION

JUNE 25, 2003

AGENDA:

9:45 - 10:00am	Sign-In
	Contractors shall assemble at the main entrance to the facility on Military Road.
10:00am	Open Meeting – Welcome
	Meeting will take place in the lunch/meeting room in the existing MATES building.
10:15am	Opening Comments by VaARNG
10:30am	Tour of existing facilities
12:00am	Meet Back in Meeting Room – Receive any Written Questions
12:00pm - 1:30pm	Lunch
1:30pm - 2:45pm	Re-Assemble in Meeting Room to "Sign-In" - "Walk Around Time"
2:45pm - 3:00pm	Close Meeting and Solicit final Written Questions.

NOTES:

1. Due to the nature of the facility the requirement that this facility remain operational, this will be the only time the site will be available to contractors to tour and inspect the project site.

2. CONTRACTORS MUST RESPOND TO THE CONTRACTING OFFICER IN WRITING THE NAMES AND COMPANIES OF THE INDIVIDUALS WHO THEY ANTICIPATE WILL ATTEND THE PRE-PROPOSAL CONFERENCE. RESPONSES MUST BE RECEIVED BY CLOSE OF BUSINESS JUNE 23, 2003.

SECTION 00010
PRICING PROPOSAL SCHEDULE

SCHEDULE I - BASE PROPOSAL.
The contractor shall furnish all plant, labor, material, equipment, etc. necessary to perform all work in strict accordance with the terms and conditions set forth in the contract to include all attachments thereto. Total proposal and price breakdown information required is shown below:

ITEM NO.	ITEM	LUMP SUM ($)
0001	For the design and construction of the additions and alterations to the Maneuver Area Training Equipment Site as described in this solicitation exclusive of the Option Items shown below.	
0001AA	All construction work on Building "A" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0001AB	All construction work on Building "B" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0001AC	All construction work on Building "D" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0001AD	All construction work on Building "E" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0001AE	All construction work outside the five (5) foot line, excluding Items 0001AF, 0001AG, 0001AH, 0001AI, 0001AJ, 0001AH, 0001AI, 0001AJ, 0001AK, and 0001AL	$
0001AF	All costs in connection with flexible bituminous pavement, complete, including compacted subgrade, aggregate base course, and all work incidental thereto as shown on the drawings and specified. _____ sq yards @ $_____ per sq yard	$
0001AG	All costs in connection with rigid concrete pavement, complete, including compacted subgrade, aggregate base course, and all work incidental thereto as shown on the drawings and specified. _____ sq yards @ $_____ per sq yard	$
0001AH	All costs associated with the installation of the perimeter security fence, including access gates, as shown on the drawings and specified.	$
0001AI	All costs associated with the installation of Site Lighting exclusive of any exterior lighting directly mounted on the new facilities.	$

ITEM NO.	ITEM	LUMP SUM ($)
0001AJ	All costs associated with the construction of the wash rack as shown on the drawings and specified.	$
0001AK	All costs associated with all site utility installations, connections, and modifications, exclusive of Item 0001AL.	$
0001AL	All costs associated with electrical site utility installations, connections, and modifications, exclusive of Item 0001AK.	$ 110,000.00
0001AM	All costs associated with demolition of the existing structures and site improvements as shown on the drawings and specified, exclusive of the demolition contained in Option #1.	$
0001AN	Design work for all items identified on the drawings and in the specifications exclusive of the design work associated with Option #2.	$
	TOTAL SCHEDULE I (Items 0001AA through 0001AN)	**$**

SCHEDULE II – OPTION ITEM #1.

The contractor shall furnish all plant, labor, material, equipment, etc. necessary to perform all work in strict accordance with the terms and conditions set forth in the contract to include all attachments thereto. Total proposal and price breakdown information required is shown below:

ITEM NO.	ITEM	LUMP SUM ($)
0002	For the design and construction of the additions and alterations to the Maneuver Area Training Equipment Site as described in this solicitation and identified below.	
0002AA	All construction work on Building "C" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0002AB	All construction work outside the five (5) foot line, excluding Items 0002AC, 0002AD and 0002AE.	$
0002AC	All costs in connection with rigid concrete pavement, complete, including compacted subgrade, aggregate base course, and all work incidental thereto as shown on the drawings and specified. _____ sq yards @ $_____ per sq yard	$
0002AD	All costs associated with all site utility installations, connections, and modifications, exclusive of Item 0002AE below.	$
0001AE	All costs associated with electrical site utility installations, connections, and modifications, exclusive of Item 0002AD.	$ 20,000.00
0002AF	All costs associated with the demolition of the existing structures identified as building 135 and 135A and site improvements as shown on the drawings and specified.	$
	TOTAL SCHEDULE II (Items 0002AA through 0002AF)	**$**

SCHEDULE III – OPTION ITEM #2.

The contractor shall furnish all plant, labor, material, equipment, etc. necessary to perform all work in strict accordance with the terms and conditions set forth in the contract to include all attachments thereto. Total proposal and price breakdown information required is shown below:

ITEM NO.	ITEM	LUMP SUM ($)
0003	For the design and construction of the additions and alterations to the Maneuver Area Training Equipment Site as described in this solicitation and identified below.	
0003AA	All construction work on Building "F" in Item 0001 within the five (5) foot line (includes all work inside of a line drawn at a perpendicular distance of five feet outside of the exterior face of foundation walls, exclusive of the rigid pavement aprons).	$
0003AC	All construction work outside the five (5) foot line, excluding Items 0003AD.	$
0003AD	All costs associated with all site utility installations, connections, and modifications, exclusive of Item 0003AE below.	$
0003AE	All costs associated with electrical site utility installations, connections, and modifications, exclusive of Item 0003AD.	$ 10,000.00
0003AF	Design work for all items identified on the drawings and in the specifications associated and required for the construction work on Building "F".	$
	TOTAL SCHEDULE III (Items 0003AA through 0003AF)	**$**

SCHEDULE IV – OPTION ITEM #3.

The contractor shall furnish all plant, labor, material, equipment, etc. necessary to perform all work in strict accordance with the terms and conditions set forth in the contract to include all attachments thereto. Total proposal and price breakdown information required is shown below:

ITEM NO.	ITEM	LUMP SUM ($)
0004	For the provision and installation of items as described in this solicitation and identified below.	
0004AA	All construction work associated with providing the lockers as identified on the drawings and specified.	$
0004AB	All construction work associated with providing the workbenches identified on the drawings and specified.	$
0004AC	All construction work associated with providing the personnel benches identified on the drawings and specified.	$
	TOTAL SCHEDULE III (Items 0004AA through 000AC)	**$**

3 CERTIFICATION.

The undersigned certifies that all items submitted in the proposal and in 100 percent complete design documents (after contract award) shall comply with the statement of work and other solicitation requirements and applicable technical specifications.

Typed Name and Title with Authorized Signature

4. NOTES.

a. The Army will procure these new facilities through a technical/price competition in accordance with the provisions set forth in this Request for Proposals (RFP). When a contract is awarded, it will be a "Firm Fixed Price Contract."

b. The Congress, in authorizing and funding this contract, has established certain cost limitations for the project. The current authorization for the complete design and construction of this project is $ 17,802,000.00. Proposals that exceed this funding limit after exercising any options may be rejected. Submission of desirable alternative features exceeding minimum requirements set forth in the Statement of Work may be considered as long as award can be made within the established funds.

c. Any proposal which is materially unbalanced as to prices for the Base or Option Schedules may be rejected. An unbalanced proposal is one which is based on prices significantly less than the cost for some work and prices which are significantly overstated for other work and can also exist where only overpricing or underpricing exists. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

d. Failure to insert prices for each item in the Base Schedule and each item in any Option Schedules may cause the proposal to be rejected.

e. The offeror agrees if he or she is awarded a contract under this RFP, which includes any option items, that the Government reserves the right to reinstate any option item(s) into the contract at any time up to 120 calendar days after notice to proceed, provided that such reinstatement would not alter the original determination of the successful offeror. If an option item is reinstated in the contract, it is also agreed that the reinstated price will be the same as the schedule price.

f. The Government may select any option in any order based on funding availabilities and programming requirements.

--End of Section--

Maneuver Area Training Equipment Site (MATES) Phase I and Phase II

Ft Pickett, VA

STATEMENT OF WORK

STATEMENT OF WORK CONTENTS

CHAPTER 1

DESIGN OBJECTIVES

1-1 **SCOPE OF WORK**. Design and construction shall comply with the specifications and requirements contained in this Request for Proposals (RFP). The design and technical criteria contained and cited in this RFP establish minimum standards for design and construction quality. The objective of this solicitation is to obtain a complex of buildings and associated site construction, complete and adequate for assignment as an Addition/Alteration of the existing Maneuver Area Training Equipment Site (MATES). This contract shall consist of the design and construction of three detached maintenance buildings, one building addition to the existing MATES facility, one detached unheated storage building, small associated structures, and site work, on Government-owned land at Ft Pickett Virginia.

SPECIAL NOTE: The existing MATES facility will remain operational during all phases of construction and demolition. The contractor will be required to ensure that utilities and access required to ensure operational capability of the existing facility is not compromised during this project. As part the project phasing the contractor will be required to provide a barrier/delineation of contractor work areas versus Government personnel work areas. All costs associated with providing temporary utility connections or temporary access necessary for the continued operation of the existing facility shall be included in the contractor's proposal.

1-1.1 **Site Area**. The site is described on the RFP drawings included as part of this solicitation. Site area is approximately 24.4 acres.

1-1.2 **Site Work**. Site work includes all design and construction of site features described in the RFP, including but not limited to, site planning, demolition, clearing, grading, erosion control, site drainage, utility systems, pavements, hard stands, pedestrian and vehicular circulation systems, site lighting, landscaping, physical security measures, fencing, and site furnishings.

1-1.3 **Special Utilities and Supplementary Construction**.

1-1.3.1 Exterior Electrical Distribution Systems: The exterior electrical distribution system is owned and operated by Southside Electric. The contractor is hereby notified that Southside Electric will be required to perform site electrical distribution work in accordance with the requirements shown in this solicitation. All costs associated with that work shall be a part of the successful contractors proposal.

1-1.3.2 Water Distribution Systems: The exterior water distribution system is operated by the Town of Blackstone. All costs (tap fees, etc) associated with water distribution work shall be a part of the successful contractors proposal. Include a $1,500.00 allowance for tap fees.

1-1.3.3 Sanitary Sewer Distribution Systems: The exterior sanitary sewer system is owned and operated by the Town of Blackstone. All costs (tap fees, etc) associated with sanitary sewer system work shall be a part of the successful contractors proposal. Include a $1,500.00 allowance for tap fees.

1-1.4 **Demolition Considerations and Requirements**. Offerors are directed to

paragraph 4-3 DEMOLITION for additional demolition, regulated closure, recycling, and clean material on-site disposal requirements. Offerors are advised that Government personnel from Fort Pickett will dispose of all filled drums currently located on the site. Proper precautions and procedures as determined by the Offeror's Qualified Designers shall be provided in the final drawings and specifications to prevent migration of contamination and to protect the health and safety of workers, occupants/tenants, and the public during demolition, handling, transportation, and disposal of all building components/materials and associated interior items/equipment. The Offeror shall be responsible for determining and performing all sampling and testing as necessary to properly and fully comply with all requirements of this RFP. Sampling and testing of all hazardous and non-hazardous materials for disposal shall be of the types and frequencies required by Federal and Commonwealth of Virginia regulations and the disposal facility. Special attention and measures which may include but not be limited to temporary covering of building openings, erection of plastic barriers, and providing positive ventilation, shall be employed while performing demolition or other work in or nearby occupied buildings/spaces. Water used to prevent migration of airborne particles or to clean demolished materials shall be properly contained and disposed of and all appropriate measures shall be taken to prevent the migration of contamination and potentially contaminated media. Asbestos survey results are provided as an attachment to this RFP. The Contractor's designated Qualified Designer, licensed for asbestos design in the Commonwealth of Virginia, shall edit and submit for approval the attached specification **Section 13280.** For bidding purposes, all painted surfaces of buildings/items to be demolished shall be assumed to contain lead-based paint. In addition, Offerors are advised that buildings 135 and 136 were originally used as locomotive repair shops until the 1970's, and therefore coal dust shall be assumed to be present on all interior items/equipment and surfaces. For bidding purposes, Offerors may assume that the entire waste stream will exhibit composite TCLP levels that allow disposal as construction debris at a non-hazardous waste landfill. The Contractor's designated Qualified Designer, licensed for lead design in the Commonwealth of Virginia, shall edit and submit for approval the attached specification **Section 13281.** Offerors are advised that all transformers containing PCBs at concentrations greater than the regulated level of 50 parts per million were taken out of service at Fort Pickett. For bidding purposes, Offerors shall assume that all light fixture ballasts contain PCBs, that all florescent lamp tubes as well as incidental items including thermostats, manometers, and switches contain mercury, and that all smoke detectors contain radioactive materials, in concentrations that require handling and disposal as a hazardous waste. All such hazardous waste materials shall be collected and placed in appropriate drums provided by Fort Pickett personnel. The Contractor shall notify the Fort Pickett personnel as drums are filled and become available, for pick-up and final disposal of the contents as the Generator. The Contractor shall utilize the attached specification **Section 13286,** and shall obtain prior approval for any revisions deemed necessary by The Contractor's designated Qualified Designer.

1-1.4.1 Building T-130: Building T-130 is a wood frame facility constructed in the 1940s. It is currently sided aluminum and has a shingle roof. It contains previously used administrative space and meeting areas. The facility is currently "Not in Use" .

1-1.4.2 Building T-124/125/127: This building is a wood frame facility constructed in the 1940s. It is currently sided with wood and has a shingle roof. It contains storage and shop areas and is currently in use by the facility.

1-1.4.3 Building T-135: This building is a 1940s vintage facility construction of wood and steel and metal siding, the interior face of the exterior wall and ceiling is covered with insulation board. It houses an operational shop with small administrative and break areas. This building has a large capacity overhead crane. Abandoned railroad tracks are incorporated into the floor slab.

1-1.4.4 Building T-136: This building is a 1940s vintage facility construction of wood and steel and metal siding. The interior face of the exterior wall and ceiling is covered with wood. It houses an operational shop with small administrative and break areas. Abandoned railroad tracks are incorporated into the floor slab.

1-1.4.5 Building T-135A: This building is a 1940s vintage facility construction of CMU and metal siding. It houses two large boilers which serve buildings 135 and 136 as well as storage and a sump area. Also associated with this structure is an oil/water separator (to be closed and demolished by the Contractor) and associated AST (to be relocated by the Government).

1-1.4.6 Fuel Storage Tanks:

1-1.4.6.1 Existing Underground Storage Tanks:

1-1.4.6.1.1 Fuel Dispensing Site: Existing underground storage tanks servicing the existing fuel dispensing equipment shall not be removed and shall remain operational.

1-1.4.6.1.2 Building Service: Two underground storage tanks exist between buildings 135 and 136. All demolition and any associated remediation required with these tank removals will be the responsibility of the Installation at Ft Picket. Close coordination between the contractor and the Government will be required to schedule and execute the removal of these tanks. If building “C” is not constructed, one tank will remain.

1-1.4.6.2 Existing Above Ground Storage Tanks (AST):

1-1.4.6.2.1 Building 134: One 500 MOGAS gallon AST will require removal and reinstallation. The Government will move the tank and contents from it’s present location to the new location. The contractor shall provide protection bollards on all four sides of the tank at it’s new location and provide connection of the tank to the existing electrical and fuel systems. All connections and provisions necessary to utilize the tanks in their new locations shall be provided by the contractor.

1-1.4.6.2.2 Building 135A: One 500 gallon DIESEL AST serving the existing steam jenny. If Building “C” is constructed, the Government will move this tank to the new oil/water separator location. The contractor shall provide protection bollards on all four sides of the tank at it’s new location and provide connection of the tank to the existing electrical and fuel systems. All connections and provisions necessary to utilize the tanks in their new locations shall be provided by the contractor.

1-1.4.6.2.3 Building 127, East Side: Three ASTs exist at this building, two (2) 275 gallon kerosene tanks and one 2000 gallon fuel oil tank. These fuel tanks shall be closed per regulations and cleaned, removed from their present location, and transported to the Ft Pickett Recycling Center. These tanks shall remain property of the Government. All material/liquid removed from the tanks shall become property of the contractor, for estimating purposes, the contractor shall assume 50 gallons of sudge/water remaining in each tank.

1-1.4.7 Building 135 Vault: North of building 135 is an underground vault previously used by the facility. The contents of the vault will be removed by the Government prior to the commencement of work on-site under this contract. The contractor shall be required to remove the vault and associated appurtenances, however, the tank will be emptied by the Government.

1-1.4.8 Miscellaneous: Any VaARNG generated hazardous waste will be properly disposed of by the Ft Pickett Environmental Department. The contractor is responsible for properly disposing of any contractor generated hazardous waste.

1-1.4.9 Existing Equipment: The Government will remove all existing equipment from the facilities scheduled for demolition prior to Contractor receipt of the facility for demolition. Contractors are advised that this equipment is still in place and operational at the time of the Pre-Proposal conference and proposal preparation period, but will not become property of the contractor and will be removed by the Government.

1-1.5 **Environmental Considerations and Mitigation Requirements**. Several underground and above-ground storage tanks, oil/water separators, and concrete vaults exist on the site, at locations described in previous paragraphs of this Chapter and indicated on the drawings attached to this RFP. Historical sampling and testing data related to these features reportedly indicate or infer the lack of contamination at regulated levels, but the Offeror shall assume for bidding purposes that contamination may be encountered while performing the required project work at these locations. The Offeror shall be responsible for preparing all appropriate final drawings and specifications to protect the health and safety of the workers and facility occupants. The final documents shall also require the Contractor to stop work in the immediate area if contaminated materials are encountered, to notify the Installation Environmental Officer and the Contracting Officer's Representative, and to proceed as directed by the Contracting Officer. See paragraphs 1-1.4 and 4-3 for additional discussion and requirements.

1-2 **APPLICABLE CRITERIA**. Applicable design and construction criteria references are listed in Appendix A to the Statement of Work. Criteria shall be taken from the most current references as of the date of issue of the RFP. Referenced codes and standards are minimum acceptable criteria. Administrative, contractual, and procedural features of the contract shall be as described in other sections of the RFP.

1-3 **DESIGN QUALITY.** The main objective of this solicitation is to obtain a MATES Complex within funds available, and to maximize design quality. Design quality is achieved through the optimization of interior planning, integration of buildings with the site, sustainability, selection of building systems for low-cost maintenance and operation, and an overall balance of aesthetics and functionality.

1-4 **DESIGN FREEDOM**. Requirements stated in this RFP are minimums. Innovative, creative, or cost-saving proposals, which meet or exceed these requirements are encouraged and will be considered more favorably. Designs may incorporate factory fabricated components or modules. The general site layout as provided in this solicitation should be followed to the greatest extent possible; the number, orientation, and organizational content of the various buildings shall not be changed.

1-5 **ENERGY AND RESOURCES CONSERVING FEATURES**. Public Law 102-486, Executive Order 12902, and Federal Regulations 10 CFR 435, require federal buildings to be

designed and constructed to reduce energy consumption in a life-cycle, cost-effective manner using renewable energy sources when economical. Products designed to conserve energy and resources by controlling the amounts of consumed energy or by operating at increased efficiencies should be considered. Minimum requirements for this project are listed in the Statement of Work.

1-6 **ACCESSIBILITY REQUIREMENTS**. All new areas and new facilities are required to be accessible to physically disabled persons shall conform to the Uniform Federal Accessibility Standards (UFAS) Federal Standard 795, and the Americans With Disabilities Act Accessibility Guidelines (ADAAG). Accessibility requirements of building spaces shall be as follows:

1-6.1 The following areas and building features shall be fully accessible in conformance with ADA/UFAS: Toilets, locker rooms, showers, administrative areas, corridors, stairs, and circulation spaces, break/training/conference rooms, drinking fountains, building fire alarm system.

1-6.2 The following areas, classified as “work areas” per ADA, shall be configured to allow disabled personnel to approach, enter, and exit the areas; provision of accessible work surfaces, shelving, and equipment, is not required in these areas: Repair bays; scheduled maintenance bays; warehouse bays; welding, painting, battery, and generator shops; general item repair; compact item repair; special environment repair; tool room; tool box storage.

1-6.3 Provide handicapped accessible entrances to the buildings in compliance with ADA/UFAS. A handicapped accessible route in conformance with ADA/UFAS shall connect all the building spaces on each floor, with the exception of the non-accessible spaces listed in paragraph 1-8.2.

1-6.4 The following areas are not required to be handicapped accessible: Mechanical, electrical, and communications equipment rooms; POL storage space; hazardous waste/materials storage space; exterior open storage; unheated storage building.

1-6.5 Handicap accessible parking spaces for visitors and non-military employee privately owned vehicles (POV) shall be provided. Required number of spaces is indicated on the provided site layout drawings. Handicapped accessible parking shall be located adjacent to other POV parking, outside the perimeter security fence.

1-6.6 Provide a minimum of one accessible pedestrian route linking handicap accessible parking areas with the new main entrance to the existing building core area. The accessible route shall be arranged to minimize the crossing of vehicular circulation routes.

1-7 **FORCE PROTECTION & ANTI-TERRORISM CONSIDERATIONS**. Project design and construction shall comply with the information and requirements outlined in this statement of work and on the drawings issued with this solicitation.

1-8 **USER BACKGROUND INFORMATION**. The MATES Facility Complex provided in response to this solicitation is required to maintain equipment and issue/turn-in for peacetime training and ensure that the equipment is prepared for mobilization. The MATES provides full time support to VaARNG units via seven (7) Organizational Maintenance Shops (OMS). MATES facility users include ARNG units from Maryland, Pennsylvania, and West Virginia as well as USAR units from Maryland and Virginia.

1-9 **PROJECT PHASING/SEQUENCING REQUIREMENTS.** The contractor shall provide

a detailed, organized, well documented phasing plan which addresses the following requirements. It is imperative that the operations of the MATES facilities be as minimally impacted as possible. The MATES Facilities and associated complex will remain operational throughout the life of this contract and it is expected that as individual facilities are completed, they will be turned over to the Government for beneficial occupancy. The requirements and constraints shown below must be addressed and included in the contractors proposal and further developed into the contractor's final project schedule after award.

1-9.1 Initial Phase (Phase 1):
- Construct the POV parking area at the corner of 8th Street and Bakers Row.
- Close Rives Road to commercial traffic
- Extend complex perimeter fencing through Rives Road, providing gates at 7th and 8th St.
- Extend complex perimeter fencing down 8th Street, along Bakers Row, and down 7th St
- Provide suitable gates at the railroad tracks at 7th and 8th Streets
- Prepare the area enclosed by the new fencing, east of the existing railroad tracks for Military Vehicle Parking.
- Demolish Building T-130 and associated improvements
- Demolish site improvements which conflict with new Buildings "A" and "B"
- Review the site layout drawing, provide personnel gates as indicated

1-9.2 Primary Phase (Phase 2):
- Install delineation fences between contractor operations areas and Government areas.
- Begin construction activities on Building "A" and Building "B".
- Fuel Dispensing Station must remain operational during all phases.

1-9.3 First Move Phase (Phase 3):
- Complete Buildings "A" and "B"
- Complete site improvements associated with Buildings "A" and "B"
- Turn Buildings "A" and "B" over to the Government.
- Allow 30 – 45 days for movement of Government staff and equipment from Building T-136 to Building "A" and from Building T-127 to Building "B".
- Prepare Buildings T-136, T-127, T-125, T-124 for demolition
- Relocate contractor/Government delineation fences.

1-9.4 Second Demolition Phase (Phase 4):
- Demolish Buildings T-136, T-127, T-125, T-124. Building T-135A shall remain operational and provide heat to Building T-135.
- Demolish wash rack adjacent to Building T-135A.
- Install delineation fences to support construction of Buildings "D" and "E".

1-9.5 Second Construction Phase (Phase 5):
- Begin Construction of Building "D" and the Unheated Storage Facility Building "E".
- Begin construction of related site improvements at Building "D"

1-9.6 Second Move Phase (Phase 6):
- Complete construction of Building "D" and associated site improvements.
- Turn Building "D" over to the Government.
- Allow 30 to 45 days for movement of Government staff and equipment from Building T-135 to Building "D".
- Complete the Unheated Storage Building "E".
- Relocate delineation fences to isolate the demolition phase to follow.

1-9.7 Third Demolition Phase (Phase 7):
- Demolish Building T-135.
- Demolish Building T-135A and associated improvements and supporting facilities.
- Relocate the delineation fences to isolate the construction area for Building “C”.

1-9.8 Third Move Phase (Phase 8):
- Begin Construction on Building “C”
- Begin Construction of related site improvements at Building “C”

1-9.9 Project Completion Phase (Phase 9):
- Complete all remaining work associated with the site and facilities.

1-9.10 Other Considerations
- Addition to Building 147 – Building “F” may take place during any of the phases identified above.
- During all phases of construction the contractor shall make suitable allowances and adjust work practices to maintain security of the site and facilities. Temporary security fencing provided by the contractor to maintain site security shall match the permanent fence in design and style.
- During all phases of work the contractor shall be responsible to maintain access control through all fence gates and openings in the work areas. Gates shall be locked at the completion of work activities each day and in no cases shall the integrity of the perimeter site fencing be compromised allowing unauthorized access to the MATES complex. The normal position for all site access gates during working hours shall be “closed”.
- During all phases of work the contractor shall maintain the existing site lighting at all times until completion of the new site lighting system.

1-10 PRICE PROPOSAL ITEM EXPLAINATIONS:

1-10.1 Base Proposal: The Base proposal must include all new, alteration, and demolition work described in this solicitation with exception of the work specifically identified as an Option below. Design of the entire project shall be included in the Base Proposal, including the design of all Options except Option #2.

1-10.2 Option #1: All work associated with the construction of Building “C” and the demolition of building 135 and 135A. If this optional item is not exercised, building 135 and 135A shall remain in place and operational. Contractor shall take all necessary steps to ensure that permanent utility service is maintained to these facilities so as not to impact future and current operation of either of these existing facilities.

1-10.3 Option #2: All work associated with the design and construction of the Addition identified as Building “F” in this solicitation.

1-10.4 Option #3: Workbenches, lockers, and benches (seating) throughout the facility and described in this Statement of Work.

1-10.5 Note: The Government may select any option(s), in any order, based on funding availabilities and Customer needs.

1-11 ATTACHMENTS TO THE STATEMENT OF WORK:

1-11.1 Attachment #1: Technical Specifications. These specifications shall be incorporated into the design specifications prepared by the contractor after award.

1-11.2 Attachment #2: National Guard Bureau Design Guide for Logistics Facilities DG 415-2, Volume 3. This Design Guide is provided for reference and background information only to aid the contractor during the design process. Where conflicts between the design guide and the Statement of Work occur, the Statement of Work shall take precedence.

1-11.3 Attachment #3: Virginia Pollution Discharge Elimination Systems (VPDES) Permit No. VAR540015.

1-11.4 Attachment #4: Blast & Paint Facility Equipment.

1-11.5 Attachment #5: Proposal Drawing Format: This attachment provides direction on formulation of drawings associated with the Phase II proposal.

1-11.6 Attachment #6: Site and Locality Maps: Self-explanatory.

1-11.7 Attachment #7: Project and Safety Signs. Information and drawings on the signage required to be posted at the construction site.

1-11.8 Attachment #8: Geotechnical Report: Soils information and geotechnical analysis of the project site.

1-11.9 Attachment #9: Reserved

1-11.10 Attachment #10: Domestic Water Data. Information on the water supply in the project area with respect to flow and pressure.

1-11.11 Attachment #11: List of Drawings: A listing of the drawings issued with this solicitation which form a part of this Statement of Work.

1-11.12 Attachment #12: Asbestos Survey Results: Asbestos information from the facilities which are to be demolished.

1-12 STOCK MATERIALS:

1-12.1 The contractor shall provide the following materials (matching those used in the actual construction) to the Government, in unopened containers, to storage rooms on site as directed by the Government. Quantities delivered shall be not less than 1.5% of the total installed material of that type. The following materials shall be included:

1-12.1.1 Acoustical Ceiling Tile
1-12.1.2 Floor Tile
1-12.1.3 Wall Base
1-12.1.4 Paint (each type and color)
1-12.1.5 Lighting Lamps
1-12.1.6 Mechanical System filters

CHAPTER 2

FUNCTIONAL AND AREA REQUIREMENTS

2-1 GENERAL REQUIREMENTS

2-1.1 **Gross building area definition**. Gross building area is measured to the outside face of exterior enclosure walls. Gross area includes floor areas, penthouses, mezzanines, and other spaces as follows:

2-1.1.1 **Areas calculated as half space**. Gross area includes one-half the area of exterior covered areas such as entries, loading platforms, breezeways, exterior corridors, and porches. Exterior covered areas are measured from the face of the enclosure wall to the edge of the covered area served. Stairs (enclosed or open) count as half space for each floor they serve.

2-1.1.2 **Excluded space**. The following spaces are excluded from gross area calculations: Attic areas where average clear height does not exceed 7 feet; crawl spaces; exterior uncovered loading platforms; open courtyards; normal roof overhangs and soffits for weather protection; uncovered ramps and steps; utility tunnels; raceways; mechanical equipment platforms and catwalks.

2-1.2 **Gross area limitations**. Maximum authorized gross building areas for the facility is 110,600 square feet. Proposals that exceed authorized gross area limitations may be considered non-conforming.

2-1.3 **Net area definition**. Net area is measured to the inside face of the room or space walls.

2-1.4 **Net Area Requirements**. Net area requirements for programmed spaces are included graphically in the programming plans. Net areas may be adjusted as much as 5% to accommodate construction requirements as long as functional and code required spaces are not effected.

2-1.5 **Functionality**. Rooms shall be sized and arranged for efficient use, circulation, and furniture placement.

2-1.6 **Life Safety and Means of Egress**. Exits and means of egress shall be provided in accordance with NFPA 101 Life Safety Code.

2-2 Functional Requirements. Functional and adjacency requirements are identified by the functional plans and the following space descriptions. The spaces may be re-arranged and adjusted slightly to accommodate construction and code requirements. The spaces listed in following paragraphs may occur in multiple locations in six buildings included in this project. Buildings A and F are additions to existing structures. Buildings B, C, D, and E are free standing structures.
See Chapter 5 for material requirements and finish schedule.

2-2.1 Classroom/Break Area.

Function: Used as a Classroom and Break Area for the users of the building.

Adjacency Reqmnts: Locate in Buildings A, B, C, D

Occupancy: 15 people

Contractor F/F/E: Provide kitchen sink, wall and base cabinets, shelf for microwave integrated into cabinet, refrigerator icemaker connection, bulletin board and markerboard in each room.

Government F/F/E: 2 vending machines, refrigerator, microwave oven, coffee maker

Structural: 4” thick slab minimum.

Mechanical: Heat and cool the space

Communications: Provide telephone/data outlets as indicated.

2-2.2 Latrine/Shower/Locker Room.

Function: Combination Restroom, Shower, and Locker Room

Adjacency Reqmnts: Locate in Buildings A, B, C, D

Structural: 4” thick slab minimum.

Plumbing: Provide Individual showers, handicap access, and floor drains.

Mechanical: Locker rooms will be heated & cooled. Provide windows for ventilation as well as forced ventilation.

Electrical: Provide convenience receptacles including receptacles near each lavatory.

Contractor F/F/E: S.S framed mirrors, toilet accessories, ceiling mounted partitions, benches and lockers as indicated on the plan. Use lockers as screens in space. Provide a paper towel dispenser for every 1.5 lavatories. Provide 2 towel pins at each shower. Provide folding seat at HC shower.

Government F/F/E: Shower curtain.

2-2.3 Physical Fitness Room.

Function: Space for exercise and exercise equipment.

Adjacency Reqmnts: Located in Building A

Occupancy: 10 people

Structural: 4” thick slab minimum.

Architectural: Operable High windows, wall mirrors on 25% of wall length from 12” to 72” above finished floor, rubber floor

Mechanical: Heating and Cooling with separate thermostat.

Communications: Provide telephone/data, cable television outlets as indicated.

Contractor F/F/E: NA

Government F/F/E: 1 each Chest Press, Pectoral Fly, Lat Pulldown, seated Leg Press, Leg extension, Dumbbell Rack-Double Tier, Olympic Squat Rack, Olympic Bench Weight Storage Unit, One set of Bars and Collars, One set of Iron Grip Dumbbells-Steel, Three sets of Iron Grip Weight Plates-Iron, Powered treadmill.

2-2.4 OISM Office.

Function: Office space for foreman and assistant and closet. Assistant space may be used for tool storage.

Adjacency Reqmnts: Located in Buildings A, B, C, D

Occupancy: 1-2 per office

Structural: 4” thick slab minimum.

Architectural: Provide window when located on exterior wall. Provide window into Work Bay (Corridor in Bldg. A) when it is adjacent.

Mechanical: Heat and cool. Thermostat for area shall be in the office.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Computer, telephone, desk, file cabinet.

Contractor F/F/E: Tack Board located on corridor wall outside of office. Hang rod and shelf in closet.

2-2.5 Fuel Ignition Repair.

Function: This area is used for inspection, testing and repairing of generators, alternators, starters, distributors, brakes, carburetors, fuel pumps, clutch assemblies and hydraulic hose assemblies.

Adjacency Reqmnts: In building A

Occupancy: 3 people.

Structural: 6” thick slab minimum.

Architectural: Exterior personnel door, interior door and 10’ wide x 14’ high roll up door

Mechanical: Heating and Cooling

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Computer, telephone, desk, file cabinet, test equipment, storage cabinets, shelves.

Contractor F/F/E: Provide 3 workbenches, tackboard

2-2.6 BII Storage.

Function: Storage space for vehicle accessories like chains, tools, jacks, machine guns, track pads, links and compressors, which are removed from the vehicle for storage. No loading dock required.

Adjacency Reqmnts: Building F added to Building 147. Vault space shall be located inside and accessed from this space.

Structural: 6” thick slab minimum.

Architectural: Block wall system. Provide a manually operated 10’ x 10’ roll-up door as well as a personnel door.

Mechanical: Heat only. Expand existing system hot water boiler.

Electrical: Connect new lighting and power circuits to existing building lighting and power panelboards.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving

2-2.7 Machine Shop.

Function: Used to repair, fabricate, rebuild and modify parts and components for vehicles and equipment

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Canvas Shop

Structural: 6” slab minimum.

Architectural: 10’ wide x 14’ tall manual roll-up door, exterior personnel door.

Mechanical: Heat and ventilated

Electrical Power: Current GFGI shop equipment. Contractor shall provide power connection for-

Equipment	Size (ft)	HP	AMPS	VOLTAGE
Milling Machine	(2) 6' x 4'	3 HP	8/4 amps	115/230, 1 phase
Lathe	6' x 3'	5 HP	13.8/ 6.9 amps	230/460, 3 phase
Lathe	12'x 5'	20 HP	50/25 amps	230/460, 3 phase
Head Lathe	3' x 3'	5 HP	13.8/ 6.9 amps	230/460, 1 phase
Drill Press	4'x 4'	NA	19 amps	208/230, 1 phase

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: As indicated above. Shelving and storage cabinets, computer, printer, telephone.

Contractor F/F/E: Work bench. 2000# electric hoist on I beam centered on the OH door running in long direction of the room, hook height of 14'.

2-2.8 Canvas Shop.

Function: Shop for making repairs and inspecting canvas items, such as truck covers, tents, storage and carrier bags.

Adjacency Reqmnts: Located in Building B

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B

Structural: 6" slab minimum.

Architectural: Forklift access through 10' wide x 14' high electric/manual overhead coiling door, personnel door, and exterior windows.

Mechanical: Heat and Ventilate.

Contractor F/F/E: 1000# Hoist electric/ centered in room on I beam in long direction of space with 14' hook height, workbench, tackboard.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: As indicated above. Shelving and storage cabinets, computer, printer, telephone.

2-2.9 Vault.

Function: Use for storage of Bradley chain guns

Adjacency Reqmnts: Building F added to bldg 147 inside of BII Storage

Structural: See chapter 5 for construction.

Architectural: See Chapter 5 for construction.

Security: Provide conduit and device boxes for Government furnished and installed JSIIDS alarm system. Provide devise boxes for balanced magnetic switch (BMS) at vault door and ceiling mounted motion detector. Provide 120 volt-20A power and data (telephone line) connection for JCIIDS control panel.

Mechanical: Dehumidifier & drain.

Government F/F/E: NG provides JSIIDS security system including BMS, motion detector and control panel with alarm transmitter.

2-2.10 Calibration Room/Storage.

Function: Collection point and storage for equipment to be calibrated including some service work.

Occupancy: 3 people.

Adjacency Reqmnts: In Building A

Structural: 4” thick slab minimum.

Architectural: Provide no windows. Weather strip doors. Seal room from air infiltration.

Mechanical: Heat and cool Calibration Room separate from other spaces to maintain 74 degrees +- 2 degrees F dry bulb and 50 +- 5 percent RH. Calibration Storage shall have standard heating and cooling.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, computer, printer, telephone.

Contractor F/F/E: 2 Workbenches in Calibration Room.

2-2.11 Glass Repair.

Function: Used to fabricate and replace glass in vehicles.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Canvas shop

Structural: 6” thick slab minimum.

Architectural:	Outside 10’ wide x 14’ tall manual roll up door, Exterior and interior personnel door.
Mechanical:	Heat and ventilate
Communications:	Provide telephone/data outlets as indicated.
Government F/F/E:	Shelving and storage cabinets, computer, printer, telephone.
Contractor F/F/E:	2 Workbenches.

2-2.12 Bulk POL Storage.

Function:	Store petroleum, oil, and lubrication materials
Adjacency Reqmnts:	1 per Bldg A, B, C, D
Structural:	6” thick slab minimum.
Architectural:	Pair of 3 foot wide exterior doors, no threshold, automatic door bottom.
Mechanical:	Heat and ventilate
Government F/F/E:	Shelving and storage cabinets.

2-2.13 Bulky Equipment Storage (Bulk Storage).

Function:	Store items like jack stands
Adjacency Reqmnts:	1 per Bldg A, B, C, D adjacent to Work Bays.
Structural:	6” thick slab minimum.
Architectural:	Opening in wall allowing forklift access from Work Bays.
Mechanical:	Heat and ventilate
Communications:	Provide telephone/data outlets as indicated.
Government F/F/E:	Shelving and storage cabinets.
Other Requirements:	In Building C include heated/ventilated room for storage of Steam Jenny, hot/cold water, power for equipment and convenience, floor drain to oil/water separator, 10’ wide x 12” high electric/manual OH coiling door.

2-2.14 General Purpose Work Bay (32’ x 32’ “Bay” on plans).

Function:	Repair of wheeled vehicles, tracked vehicles, tank turrets and chassis

Occupancy: 3 people per bay

Adjacency Reqmnts: Bays occur in Buildings A, C, and D. A bay is one nominal 32’ x 32’ area. Bays are normally clustered together. Provide 4’ and 8’ clear safety zones as indicated on the plans and as required by regulations.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow crane, equipment, mechanical and electrical clearances.

Architectural: Painted clear safety lanes, work bay with computer/power on side of each bay. Provide skylights equal to 5% of the floor area. 28’ wide x 14’ high electric/manual roll-up door. Provide personnel doors as indicated on the plans and as required by code. All mechanical, plumbing, electrical, structural and equipment items must allow for 14’ high clearance and operation of crane and maneuvering of vehicles.

Plumbing: No trench drains. Provide hot and cold water at mop sink; cold water/ power/compressed air on hose reels.

Mechanical: Heat/ Ventilate, mops sink every 4 bays, vehicle exhaust system, and general ventilation system.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light in each 32’ x 32’ bay.

Communications: Duplex data outlet in each bay. Provide telephone/data outlets as indicated.

Government F/F/E: Misc. tools and equipment, shelves, cabinets.

Contractor F/F/E: Crane for bldg shall cover multiple bays. The crane shall have access inside of bay to within 3’ of all clear zone edges. 20-ton capacity bridge crane, 16 ‘ hook height. Eye wash, electric water cooler (two per building), bulletin board at each end of bldg. Workbench in each bay.

Hazardous Location: Wiring and equipment located within general purpose work bay areas shall conform to NFPA 70, National Electric Code, Article 511. Receptacles in these areas shall be mounted 48” above finished floor.

2-2.15 Welding Shop.

Function: Welding work. 32’ x 64’ bay.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Lubrication Shop and Body Shop

Structural Reqmnts: 8” thick slab minimum. Structure shall allow crane, mechanical and electrical clearances.

Architectural: Paint safety area on floor. Skylight equal to 5% of floor area. Provide 7 1/2 ton bridge crane with 16' hook height. Crane may serve the Body and Welding Shops. 28' wide x 14' high electric/manual roll-up door. Personnel door.

Plumbing: Hose reel for water and air.

Mechanical: Heat and ventilate. Portable exhaust and room exhaust for welding function.

Electrical Power: Convenience and equipment power

Equipment	**Size (ft)**	**HP**	**AMPS**	**VOLTAGE**
Mig Welder (2)	4 x 4	NA	46/40	208/230, 1 phase
Hobart Welder(2)	4 x 4	NA	13.8/ 6.9	230/460, 3 phase
Dry Rod stab	4 x 4	NA	NA	230/460, 1 phase
Chop Saw	4 x 4	NA	19	230/ 208/460, 3 phase
Tig Welder(2)	4 x 4	NA	100/50	230/460, 1 phase
Plasma Cutter(2)	4 x 4	NA	80	208/230, 1 phase
Grinder	4 x 4	3	7.7	230, 1 phase
Drill Press	5 x 4	NA	19	230, 3 phase
Band saw	4 x 4	1.5	4.8	208, 1 phase
Metal Sheer	6 x 12	7.5	9.9	230/460, 3 phase

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, computer, printer, telephone, welding equipment listed above.

Contractor F/F/E: Workbench.

2-2.16 Wash Shop

Function: Used to clean vehicles, other equipment assembles, components and parts by means of manual wash with hose bibs. 32' x 64' bay.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Lubrication, Welding and Body Shop, near Paint Bays

Structural Reqmnts: 8" thick slab minimum. Structure shall allow crane, equipment, mechanical and electrical clearances.

Architectural: Paint safety area on floor. Skylight equal to 5% of floor area. 28' wide x 14' high electric/mechanical roll-up door. Personnel door.

Plumbing: Mop sink, floor drains, hose bibbs, hose reel for water and air. Hot/cold water supply for low and high pressure washing equipment.

Mechanical: Heat and ventilate.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light in each 32' x 32' bay.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone, high pressure wash equipment.

Contractor F/F/E: Workbench.

Other Requirements: Wash Bay includes a separately enclosed Steam Rack room for storing steam cleaning equipment, exterior access for use of equipment, floor and equipment drain to oil/water separator, hot/cold water connections, power for equipment, heat/ventilation. Steam Rack Room shall be enclosed by full height walls, have floor drain, power for equipment, hot/cold water, heat/ventilation.

2-2.17 Paint Stripping Bay.

Function: Containment of Paint Stripping booth/equipment. Includes room for Paint Stripping Storage and Paint Stripping Medium Storage as indicated on plans. Space is a drive through operation connected to the Paint Preparation Bay.

Occupancy: 3 people in each bay

Adjacency Reqmnts: Located in Building B adjacent to Paint Preparation Bay.

Structural Reqmnts: 8" thick slab minimum. Structure shall allow booth, equipment, mechanical and electrical clearances.

Architectural: 22' wide x 16' high electric/mechanical roll-up door on each end. Personnel doors.

Mechanical: Heat and ventilate. Provide equipment to support the stripping booth. Compressor to furnish Grade D, Type I compressed respirator air.

Plumbing: As required for equipment.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone.

Contractor F/F/E: Workbench. Paint stripping booth and equipment (see Chapter 5 and Attachments for description). Include eyewash, lavatory, and fresh air system.

Other Requirements: OSHA & Environmental approval of installation is required.

2-2.18 Paint Preparation Bay.

Function: Final preparation of vehicles for painting. Space is a drive through operation connected to the Paint and Stripping Bay.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B between Paint and Stripping Bay.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow equipment, mechanical and electrical clearances.

Architectural: 22’ wide x 16’ high roll-up door on each end. Personnel doors.

Mechanical: Heat and ventilate.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light Provide high quality lighting for final vehicle inspection before painting.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone.

Contractor F/F/E: Workbench.

2-2.19 Paint Bay.

Function: Painting of wheel and track vehicles. Space is a drive through operation connected to the Paint Preparation. Included are Paint Storage and Paint Workroom.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Paint Preparation Bay.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow paint booth, mechanical and electrical clearances.

Architectural: 22’ wide x 16’ high electric/mechanical roll-up door on each end. Personnel doors.

Mechanical: Heat and ventilate. Provide equipment to support the paint booth.

Electrical Power:

Equipment	HP	Amps	Voltage
Paint Shaker	.5	7.8	120/ 1 phase
Fresh Air Pump	1.5	5.3	240/ 3 phase
Paint Booth/equipment	Electrical characteristics to be determined by Offeror.		

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light. Bay and booth lighting shall be provided.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone.

Contractor F/F/E: Workbench. Prepackaged paint booth is required (see Chapter 5 and Attachments for description). Include eyewash, lavatory, and fresh air system. Provide all code/regulatory required equipment for Paint Storage and Paint Workroom.

Hazardous Location: Wiring and equipment located within paint booth bay shall conform to NFPA 70, National Electric Code, Article 516.

Other Requirements: OSHA & Environmental approval of installation is required.

2-2.20 Lubrication Bay.

Function: Used to inspect lubrication levels, change lubricants, Lubricate fittings, inspect and replace damaged fittings, and make visual inspections on other items such as belts, hoses, and gaskets. 32’ x 64’ bay.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Wash, Welding and Body Shop.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow crane, mechanical and electrical clearances.

Architectural: Paint safety area on floor. 28’ wide x 14’ high roll-up door. Personnel door.

Mechanical: Heat and ventilate.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz

auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone, lubrication equipment.

Contractor F/F/E: Workbench. Hose reel set with water and compressed air and power.

2-2.21 Engine and Transmission Test Cell.

Function: Used to repair, test and inspect transmissions and engines used on military equipment including track vehicles.

Occupancy: 3 people.

Adjacency Reqmnts: In Building A open to Electronics Bay.

Structural: 8” thick slab minimum. Structure shall allow crane, equipment, mechanical and electrical clearances.

Architectural: Paint safety area on floor, provide 35 ton bridge crane with 21’-6” hook height. Crane shall serve Engine/Transmission and both Electronics Shops. 28’ wide x 14’ high roll-up door. Exterior and interior personnel door. Sound attenuated room to prevent exposure to noise hazard. STC 48 rated wall adjacent to Corridors.

Mechanical: Heat and ventilate. Vehicle direct exhaust system is required.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone, test equipment.

Contractor F/F/E: 2 Workbenches. Hose reel set with water, compressed air, and power.

2-2.22 Electronics Bay.

Function: Used to maintain, repair, and install electronic and communication equipment, i.e., telephones, telegraph, radio, radar and surveillance equipment.

Occupancy: 3 people per bay.

Adjacency Reqmnts: In Building A open to Engine/Transmission Bay.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow crane, mechanical and electrical clearances.

Architectural: Paint safety area on floor, provide 35 ton bridge crane with 21’-6” hook height. Crane shall serve Engine/Transmission and both Electronics Shops. 28’ wide x 14’ high roll-up door. Exterior and interior personnel door. Sound attenuated room to prevent exposure to noise hazard. STC 48 rated wall adjacent to Corridors.

Mechanical: Heat and ventilate. Vehicle direct exhaust system is required.

Electrical Power: Provide 110V continuous wall electrical outlet strip over each workbench. Provide 28V DC power receptacle box at each bench (converter is not in contract). Circuit shall be rated for 30 amperes.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light in each bay.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, telephone, test equipment, computer, printer.

Contractor F/F/E: Provide 3 workbenches per bay. Hose reel set (water, power, compressed air) share between bays.

2-2.23 Body Shop.

Function: Vehicle body repair. 32’ x 64’ bay.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Wash, Welding and Body Shop.

Architectural: Paint safety area on floor. Skylight equal to 5% of floor area. Provide 7 1/2-ton bridge crane with 16’ hook height. Crane may serve the Welding and Body Shops. 28’ wide x 14’ high roll-up door. Personnel door.

Structural Reqmnts: 8” thick slab minimum. Structure shall allow crane, equipment, mechanical and electrical clearances.

Mechanical: Heat and ventilate.

Lighting: Metal halide enclosed high bay luminaries. Provide quick re-strike quartz auxiliary in sufficient fixtures to achieve a minimum of 1 FC of illumination during warm up and re-strike periods of HID luminaries. Provide heavy-duty cord reel light.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Welders, metal press. Shelving and storage cabinets, telephone, lubrication equipment.

Contractor F/F/E: Workbench. Hose reel set with water, power, and compressed air.

2-2.24 Facility Maintenance and Storage.

Function: Open storage area adjacent to Work Bays, closed Storage, and Janitors Closet.

Occupancy: 0 people.

Adjacency Reqmnts: Located in Buildings A, B, C, D.

Structural: 6” thick slab minimum.

Plumbing: Hot and cold water to Mop sink, service to equipment.

Mechanical: Heat and ventilate.

Government F/F/E: Shelving and storage cabinets. Washer- Maytag Model PAV2300AWW 120V 11.5 Amps 60 hz, and Dryer- Whirlpool Model LER5620KQ1 120/240V 28 Amps 4” metal exhaust required. Landa Parts Washer 230/1 phase, 2 horsepower, 30 amps.

Contractor F/F/E: Mop sink, mop holder.

2-2.25 Mechanical Room.

Function: Mechanical equipment storage

Adjacency Reqmnts: Locate in building A, B, C and D

Structural: 4” thick slab minimum. Provide housekeeping slabs below all equipment.

Architectural: Pair of exterior doors.

Plumbing: Floor drain

Mechanical: Hot water unit heaters, Broiler, air handlers, work equipment air compressors. Fresh air louvers shall be above 10’ AFF.

Lighting: Fluorescent.

Contractor F/F/E: Air Compressor 90 cfm at 175 psi

Other Requirements: Equipment air compressor shall be located in the mechanical room, enclosed by full height 8” cmu walls, with insulated hollow metal door.

2-2.26 Electrical Room.

Function: Electrical panels, transformers

Adjacency Reqmnts: Located in Buildings A, B, C, and D. Buildings E and F shall have panels installed on walls in the main space.

Structural: 4” thick slab minimum.

Architectural: Exterior Door

Mechanical: Heat and ventilate.

Lighting: Fluorescent.

2-2.27 Communications Room.

Function: Communication equipment room for fiber optic, telephone, and data system.

Adjacency Reqmnts: Located in Buildings A, B, C and D

Structural: 4” thick slab minimum.

Architectural: Provide 2- ¾” x 4’ x 8’ plywood panels on wall.

Mechanical: Provide year round air conditioning

Electrical: Provide a minimum of two general-purpose 110V quadraplex outlets.

Lighting: Fluorescent.

Government F/F/E: Data server system

Contractor F/F/E: Rack, panels

2-2.28 Unheated Metal Storage.

Function: Store steel, containers, pallet, and tank parts

Adjacency Reqmnts: Free standing Building E

Structural Reqmnts: 8” thick slab minimum.

Architectural: Pre-engineered metal bldg similar to other buildings, drive through doors each end, electric/manual operated 16’ wide x 14’ high, 2 pair of double man door front/back, interior clear height to structure/lights/sprinkler of 14 feet minimum. Provide skylight equal to 5% of floor area minimum. Insulation is not required except at the perimeter below the slab. Ridge vent with wall louvers for circulation.

Mechanical: Provide natural ventilation.

Lighting: Industrial fluorescent with cold weather ballasts and lamp guards. Provide zone switching.

Government F/F/E: Shelving and storage racks.

2-2.29 Controlled Waste Handling.

Function: Storage for 55-gallon drums of used oil

Adjacency Reqmnts: Located on the end of Buildings A, B, C, and D

Structural: 6” crushed stone base minimum below building.

Architectural: Prefab structure, see chapter 5 for description.

Contractor F/F/E: Emergency eye wash with audible alarm.

2-2.30 Radiator Test and Repair.

Function: Used to test and repair radiators for wheeled and track vehicles.

Occupancy: 3 people.

Adjacency Reqmnts: Located in Building B adjacent to Machine Shop.

Structural: 6” thick slab minimum.

Architectural: 10’ wide x 12’ high manual roll up door, interior personnel door.

Mechanical: Heat and ventilate

Plumbing: Hot/cold water to equipment.

Communications: Provide telephone/data outlets as indicated.

Government F/F/E: Shelving and storage cabinets, computer, printer, telephone, test equipment.

Contractor F/F/E: Work bench.

2-2.31 Corridor.

Function: Access and egress from spaces.

Occupancy: NA

Adjacency Reqmnts: All occupied buildings.

Structural: 4” thick slab minimum.

Architectural: Provide doors to control noise and as required by drawings and code.

Mechanical: Heat and cool in areas that are heated and cooled.

Communications: Provide telephone/data outlets as indicated.

2-2.32 Vestibule.

Function: Access and egress from corridor.

Occupancy: NA

Adjacency Reqmnts: Building A.

Structural: 4” thick slab minimum.

Architectural: Provide storefront type doors and windows.

Mechanical: Heat and cool.

CHAPTER 3

SITE PLANNING AND DESIGN

3-1 **SCOPE OF WORK.** The objective of this solicitation is to obtain a complex of buildings and associated site construction, complete and adequate for assignment as an Addition/Alteration of the existing Maneuver Area Training Equipment Site (MATES). The site boundaries and project composition are fixed. Based on the graphic and narrative descriptions of site opportunities and constraints provided, the offeror shall verify that the site meets the program requirements.

3-2 **SITE VERIFICATION.** Graphic and narrative descriptions of site opportunities and constraints have been provided in this solicitation. Conceptual level site plans are included in this solicitation indicating the general layout of the project features. Each offeror shall perform a detailed site analysis to determine that the site meets the program requirements. See Chapter 1 DESIGN OBJECTIVES, paragraphs 1-1.4 and 1-1.5 for special requirements related to demolition and for a description of anticipated environmental conditions and associated requirements

3-3 **EXISTING CONDITIONS.** The offeror shall be provided with a digital topographic survey for this site by the Government. It is the offeror's responsibility to verify the Government-furnished survey and obtain all additional survey information that may be required for a completed design and construction project. Any discrepancies which are found in the Government furnished survey shall be brought to the immediate attention of the Contracting Officer for clarification.

3-3.1 **Station Maps.** Maps of the existing utility distribution systems including commercially owned utilities (i.e.: telephone, cable television, gas, etc.) may be obtained from the Department of Public Works at the installation.

The electrical distribution system on the site is owned by the Southside Electrical Cooperative. Point of contact with this utility owner is :.

The water mains located on the site are owned by the Town of Blackstone. Point of contact with this utility owner is Mr Larry Palmore, Town Manager.

The sewer mains located on the site are operated by the Town of Blackstone but owned by the Department of the Army. Point of contact with this utility owner is the COR.

3-4 **EXCAVATION PERMITS.** The contractor shall obtain approved Ft Pickett excavation permits prior to digging. Request for excavation permits shall be in accordance with installation policies. MISS UTILITY of Virginia shall be notified (1-800-552-7001) a minimum of 7 days prior to performing any subsurface work, in order to obtain utility clearance and markings.

3-5 **SITE DEVELOPMENT PLAN.** Provide a site development plan that shows the spatial and functional arrangement of all MATES Complex requirements. The site development plan provided with this solicitation provides the overall site guidance in planning the new facility construction and alterations. This plan is acceptable to the Government, if the Contractor wishes to offer an alternate site development plan, the plan should ensure an economical, compatible and functional land use development that utilizes the advantages of the site, allows convenient access to the units which the MATES supports and their maneuvering areas, and fosters visual order**.** The site development plan should show consideration for the site opportunities and constraints, program requirements, and specific site design criteria and guidance provided.

3-6 **GRADING AND DRAINAGE.** The grading should maintain existing topography while recognizing standard gradients. Segregate areas of drainage which are likely to be contaminated by fuel or other maintenance fluids from other drainage areas to prevent discharge of contaminants. There should be a balance of the quantity of cut and fill soils which would create a smooth transition of graded areas into the existing site. Grading should manage site runoff to maintain rate of flow and quantity to pre-construction levels, or reduce site runoff where possible. The principles of positive drainage should be applied to control the conditions that remove rainfall away from facilities and functions. Federal, State and local regulations regarding the design of stormwater management systems shall be considered the minimum design criteria. Additionally, minimize the impact of construction activities on drainage and prevent loss of soils by water and wind erosion. Designs which improve on existing water quality by incorporating sustainable design principles are encouraged, consistent with budget constraints and activity requirements.

3-7 **GENERAL SITE DESIGN CRITERIA.** The provided site drawings are to be used as guidance for site design. Minimum spacing between buildings shall be as shown. The site design shall address the following: site organization, life safety, circulation systems, wind and noise control, land forms (i.e.; mounds, swales, ponds, etc.), lawns and shaded areas, vehicular access, organizational vehicle parking spaces, non-organizational vehicle parking spaces, POL storage and POL vehicle parking areas, handicapped parking, visitor parking area, service entrances, connecting walks, utility corridors, fire protection access, site lighting, site furnishings, mechanical enclosures, landscaping, and etc.

3-8 **CIRCULATION AND PARKING.** The vehicular and pedestrian circulation system shall promote safe, efficient movement of vehicles and pedestrians within the site area. The following criteria shall be considered for designing streets and drives for vehicles and pedestrians:

3-8.1 **Pedestrian Circulation.** Pedestrian circulation should be safe and separate from vehicle circulation to the greatest extent possible. Provide good sidewalk layout to connect all facility entrances with parking and site facilities and existing walks. Pedestrian circulation should be based on pedestrian desired lines of walking between site facilities and existing walks. Design pedestrian concentration areas with adequate paved area.

3-8.2 **Vehicular Circulation.** Vehicle circulation aisles shall be 24 ft wide. Arrange circulation to access parking in an efficient and organized manner, and to avoid congestion. Vehicular circulation layout is determined by applying the design vehicle templates to the site design. The passenger car class includes passenger cars and light delivery trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational - privately owned vehicle (POV). The truck class template includes single-unit trucks, buses, truck tractor-semitrailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide the vehicle clearances that are required to meet traffic safety for emergency vehicles, service vehicles, and delivery vehicles.

3-8.3 **Vehicular Parking.** Vehicle parking spaces shall be as shown on the site plans.

3-8.4 **Signage**: All existing signage on the site shall be reinstalled at the locations directed. All new road and street signs shall comply with the Manual on Uniform Traffic Controls, MUTCD, Millennium Edition.

3-9 **ANTITERRORISM/FORCE PROTECTION AND SITE SECURITY**

3-9.1 **Antiterrorism/Force Protection Construction Standards.** The layout of the site shall

generally be in accordance with the site plans attached to this solicitation.

3-9.2 **Site Perimeter Fence.** Provide at a minimum, a perimeter fence of 6-ft high chain link anti-climber security fence. Fence fabric shall be 9 gauge steel, with hot-dipped galvanized coating to 1.8 oz per square inch. Provide with 3 strands of four point barbed wire. Top tension wire shall be a No. 7 wire. A 9-ft wide zone clear of trees and shrubs is required on each side of the fence. The clear zone shall require minimal maintenance. Design in accordance with STD 872-90-03, standard design FE6.

3-9.3 **Sentry Booth.** A Sentry Booth is not required.

3-10 **SITE STORAGE.** Areas of the hardstand will be designated as storage areas for various use categories. Where possible, locate storage areas to maintain unit cohesion.

3-10.1 **Petroleum, Oil, and Lubricants (POL) Storage Building.** Provide a building for the storage of oil, lubricants, and flammable solvents. Provide a minimum of 100 ft^2. Provide an access apron at the entry of this building. Maintain 50 ft from other site structures to avoid the need for sprinkling this facility.

3-11 **SIDEWALK PLANNING AND DESIGN.** Walks from POV parking areas or approaches to the facility complex shall be a minimum of 4-ft wide exclusive of curb width, and made wire mesh reinforced concrete with a minimum thickness of 4-in. Ramps for handicapped individuals shall be provided at intersections by depressing street curbs and adjacent sidewalk. Where areas are specifically planned for pedestrian access and circulation, they shall be so marked within the compound.

3-12 **LANDSCAPE PLANTING PLAN.** Landscaping shall be in accordance with locally acceptable practices. The offeror shall obtain and use the services of a qualified landscape architect, experienced in site planning and planting design. Choose plant materials on the basis of plant hardiness, climate, soil conditions, low maintenance, and quality. Selected plant materials shall be easily maintained and tolerant of the specific site conditions. Incorporate sustainable design principles into the selection of plants. Planting or seeding shall occur only during periods when beneficial results can be obtained.

3-12.1 **Ground Cover.** Plant varieties shall be nursery grown or plantation grown stock. They shall be grown under climatic conditions similar to those in the locality of the project.

3-12.1.1 **Quality.** Well-shaped, well-grown, vigorous, healthy plants having healthy and well-branched root systems shall be provided. Plants shall be free from disease, harmful insects and insect eggs, sunscald injury, disfigurement, and abrasion. Plants shall be provided that are typical of the species or variety.

3-12.1.1.1 **Ground Cover.** Plants shall be provided with the minimum number of runners and length of runner as recommended by the agency having jurisdiction. Plants shall be furnished that have heavy, well developed, and balanced top with vigorous well developed root system, and shall be furnished in containers.

3-12.1.1.2 **Measurement.** Plant measurements shall be in accordance with the agency having jurisdiction.

3-12.1.3 **Percolation Test.** Test for percolation shall be done to determine positive drainage of plant pits and beds. All soil and drainage conditions detrimental to the growth of plant material shall

be identified and a proposal correcting the conditions shall be submitted.

3-12.1.4 **Soil Test.** A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plant material specified.

3-12.1.5 **Installation.** Verify the location of underground utilities. When obstructions below ground or poor drainage affect the planting operation, proposed adjustments to plant location, type of plant, and planting method or drainage correction shall be submitted. The plant material shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of plant material specified. Plant pits shall be excavated and backfilled as recommended by the agency having jurisdiction. The planting operation shall be performed only during periods when beneficial results can be obtained. When special conditions warrant a variance to the planting operations, proposed planting times should be submitted.

3-12.1.6 **Maintenance During Planting Operation.** Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed and shall continue until the plant establishment period commences.

3-12.1.7 **Plant Establishment Period.** On completion of the last day of the planting operation, the plant establishment period for maintaining installed plants in a healthy growing condition shall commence and shall be in effect for the remaining contract time period not to exceed 12 months. When the planting operation extends over more than one season or there is a variance to the planting times, the plant establishment periods shall be established for the work completed.

3-12.1.8 **Maintenance During Establishment Period.** The maintenance of plants shall include straightening plants, protecting plant areas from erosion, maintaining erosion material, supplementing mulch, maintaining edging of beds, checking for girdling of plants and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants.

3-12.1.9 **Unhealthy Plant.** A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit in accordance with the following warranty paragraph.

3-12.1.10 **Warranty.** Furnished plant material shall be guaranteed to be in a vigorous growing condition for a period of 12 months regardless of the contract time period. A plant shall be replaced one time under this guarantee. Transplanting existing plants requires no guarantee.

3-12.2 **Turf.** Turf consists of seed, sod, and sprigs.

3-12.2.1 **Seed.** State approved seed of the latest season's crop shall be provided in the original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with applicable State seed laws. Seed mixtures shall be proportioned by weight. Weed seed shall not exceed one percent by weight of the total mixture.

3-12.2.2 **Sod.** State approved sod shall be provided as classified by applicable State laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking. The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 2 in in any dimension, woody plant roots, and other material detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregular

shaped pieces of sod and torn or uneven ends shall be rejected. Sod shall be machine cut to a uniform thickness of 1.25 in within a tolerance of ¼ in excluding top growth and thatch. Measurement for thickness shall exclude top growth and thatch. The limitation of time between harvesting and placing sod shall be 36 hours.

3-12.2.3 **Sprig Quality.** The cultivar shall be provided as healthy living stems, stolons, or rhizomes with attached roots, including two or three nodes, and shall be from 4 to 6 inches long, without adhering soil. Sprigs shall be provided which have been grown under climatic conditions similar to those in the locality of the project. Sprigs shall be obtained from heavy and dense sod, free from weeds or other material detrimental to a healthy stand of turf. Sprigs that have been exposed to heat or excessive drying shall be rejected. The time limitation between harvesting and placing sprigs shall be 24 hours.

3-12.2.4 **Soil Test.** A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified.

3-12.2.5 **Temporary Turf Cover.** When there are contract delays in the turfing operation or a quick cover is required to prevent erosion, the areas designated for turf shall be seeded with a temporary seed. When no other turfing materials have been applied, the quantity of one-half of the required soil amendments shall be applied and the area tilled.

3-12.2.6 **Final Turf.** The turf shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of turf specified. The turf operations shall be performed only during periods when beneficial results can be obtained. Drainage patterns shall be maintained. The turf shall be installed by using the methods as recommended by the trade for the type and variety of turf specified. Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required. The turf establishment period for establishing a healthy stand of turf shall begin on the first day of work under the turfing contract and shall end three months after the last day of the turfing operation. An unsatisfactory stand of turf shall be repaired as soon as turfing conditions permit.

3-12.2.7 **Satisfactory Stand of Turf.**

3-12.2.7.1 **Seeded Lawn Area.** A satisfactory stand of turf from the seeding operation for a lawn area is defined as a minimum of 160 grass plants per square meter. Bare spots shall be no larger than 6 inches square. The total bare spots shall not exceed two (2) percent of the total seeded area.

3-12.2.7.2 **Seeded Field Area.** A satisfactory stand of turf from the seeding operation for a field area is defined as a minimum of 100 grass plants per square meter. The total bare spots shall not exceed two (2) percent of the total seeded area.

3-12.2.7.3 **Sodded Area.** A satisfactory stand of turf from the sodding operation is defined as living sod uniform in color and texture. Bare spots shall be no larger than
2 in square.

3-12.2.7.4 **Sprigged Area.** A satisfactory stand of turf from the sprigging operation is defined as a minimum of 20 sprigs per square meter. Bare spots shall be no larger than 2 square inch. The total bare spots shall not exceed two (2) percent of the total sprigged area.

3-12.2.8 **Maintenance During Establishment Period.** The maintenance of the turfed areas

shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turf areas from traffic, mowing, watering, post-fertilization, and replacing unsatisfactory turf areas.

3-13 **VEHICLE/EQUIPMENT WASHDOWN AREA**. Provide a concrete paved vehicle/equipment washdown area at a location on the site. Provide washing station with a double hose bib and outdoor rated electrical outlet at each station for activity furnished/owned portable pressure washers. Each washing station shall be a minimum of 20-ft x 36-ft in size. Each washdown area shall be graded to drain all surface water to an open channel or trench drain. Open channel or trench drain shall be of suitable design to support easy cleaning and maintenance. All drainage water shall be directed first to a grit removal device and then to an oil water separator. A post indicator valve shall be installed to bypass the sanitary sewer system and allow normal stormwater to flow to the storm sewer system.

3-14 **EXTERIOR COMMUNICATIONS OUTLETS.** Provide empty 1” underground communications conduit with pull wire from Humidity Control Program control cabinet to nearest building communications closet from system monitor cabling by the Government.

CHAPTER 4

SITE ENGINEERING

4-1 SOILS.

4-1.1 **Geotechnical Report.** A Geotechnical Report is provided as part of this RFP in Attachment 8. The report provides an overview of subsurface conditions and general recommendations for design, and is furnished for informational purposes. The offeror to whom this contract is awarded, shall be responsible for determining all project-specific geotechnical conditions and shall perform a geotechnical investigation specific to the proposed project to supplement the information contained in the attached Geotechnical Report. The investigation shall be coordinated with Mr. Kevin Cumbea (Building 134, phone [434] 292-2620) or the designated User POC, and the investigation area shall be restored to its original condition, such that interference with User activities is minimized. The contractor shall submit a project specific geotechnical report, certified by a professional engineer experienced in geotechnical engineering in the project geographic region, to include, but not limited to: description and classification of geologic, soil, rock, and groundwater conditions; subsurface profiles, boring logs and exploration location plans, and summary of laboratory and field test results, for both government and Offeror-performed subsurface investigations; expected local soil, rock, and groundwater problems and recommended design/construction measures; soil resistivity, moisture, and chemistry for cathodic protection; infiltration and permeability conditions; surface and subsurface drainage conditions; description of existing foundation systems; bearing capacity of soil; estimated differential and total settlement with supporting calculations; recommendations for type and minimum dimensions and depth of foundation systems, for layer thickness and materials for each pavement section, and for dimensions and composition of each slab on grade section; recommendations for retaining walls and foundation drainage systems; general earthwork, compaction, dewatering, erosion and sediment control, excavation and safety requirements; recommendations for field tests beyond those specified herein; and recommendations for installing new foundations/structures without disturbing any existing foundations/structures and which result in a maximum differential settlement of ¼-inch relative to adjoining existing structures. All recommendations/conclusions shall be supported by appropriate calculations and detailed engineering analyses.

4-1.1.1 **Certification.** The offeror and his or her professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the site specific geotechnical conditions and with all requirements specified herein. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the First Site/Utility Design Submittal (100%) . If revisions are made to the design submission, a new certification shall be provided with the next design submission.

4-1.1.2 **Changed Conditions**. As noted in paragraph 4-1.1, the geotechnical report in the RFP is for informational purposes and the offeror awarded the contract is responsible for conducting his or her own project specific geotechnical investigation and report. If the contractor encounters contamination or any conditions different than provided in the RFP and that will result in cost impacts, the contractor shall notify the Government with the submission of the contractor project specific geotechnical report. The Government shall evaluate the notification to determine if a Changed Condition exists prior to the approval to initiate construction.

4-1.2 **Soil Preparation and Compaction.** Construction experience at Fort Pickett indicates that perched water and spring conditions are often encountered at variable depths. Proper drainage will be required for all excavations and earthwork, and dewatering will be necessary if

perched water or springs are encountered during foundation and utility excavations. The existing subgrade soils are subject to loss of strength and will become unstable for construction equipment during wet weather. The Contractor shall expect construction activities to be curtailed during and after wet periods, and shall replace at their expense any subgrade soils or placed materials that become unsatisfactory due to over-stressing, weather, or any other causes. Fill/backfill placed within and a minimum of 5 feet beyond building footprints shall be Structural Fill consisting of clean natural well-graded cohesionless material with a maximum particle size of 1-1/2 inch and containing at least 90 percent by weight passing the ½-inch sieve. Cohesive materials are defined as containing at least 10 percent by weight fine-grained material having a liquid limit greater than 10; all other materials shall be considered cohesionless. Materials classified as CL, ML, CH, and MH are unsatisfactory for utility backfill or for any fill in building and paved areas, and materials classified as OH, OL, and PT are unsatisfactory insitu and as fill of any kind. All fill/backfill materials, including base and gravel layers shall be placed in minimum 3 inch and maximum 6-inch compacted thickness lifts. Soil compaction shall be achieved by equipment well-suited to the type and condition of materials being compacted and as approved by a professional geotechnical engineer. Material shall be moistened or aerated as necessary, but in no case to more than 3 percent plus or minus from optimum, to provide the moisture content that will readily facilitate obtaining the compaction specified with the equipment used. Compact the upper 6 inches of subgrade materials and each layer of fill/backfill beneath structures, hardstands and pavements to not less than 90 and 95 percent, and in all other areas to not less than 85 and 90 percent, of ASTM D-1557 maximum laboratory density for cohesive and cohesionless soils respectively. Aggregate base beneath flexible pavements shall be compacted to not less than 100 percent, and rigid pavement base and gravel/stone surfacing layers shall be compacted to not less than 95 percent, of ASTM D-1557 maximum laboratory density.

4-1.2.1 **Field Testing.** The following minimum testing requirements for subgrade, fill, backfill, and aggregate base materials shall be incorporated into the specifications:

a) A minimum of one moisture density test (ASTM D1557) shall be performed for each on-site or borrow soil material proposed for fill, backfill, and base course.
b) One Atterberg Limits test (ASTM D 4318) and one gradation analysis (ASTM D 422) shall be performed for every ten field density tests.
c) Field Density tests shall be performed using only the sand cone method (ASTM D 1556) and shall be performed on compacted subgrade and on each layer of fill/backfill/base at minimum frequencies of:
    i) One test per column footing and per 100 feet of foundation wall.
    ii) One test per 100 feet of utility trench.
    iii) One test per 2000 square feet of paved area and building area, and per 4000 square feet for all other areas.

4-1.3 **Capillary Water Barrier.** A capillary water barrier is required for all interior slabs on grade, including storage rooms and excluding vehicle/traffic areas. As a minimum, the capillary water barrier shall consist of a 6 mil polyethylene sheet with all joints and seams taped to provide a continuous barrier and underlain by a minimum of 6 inches of well-draining and structurally adequate granular material consisting of VDOT Size No. 57 or approved equivalent.

4-1.4 **Soil Treatment.** Soil treatment for termites shall be by the chemical method and shall be applied to all excavation surfaces, both horizontal and vertical, located within the building line, and to any other surfaces deemed necessary to provide the required protection. The Contractor shall be duly licensed in the Commonwealth of Virginia to apply the selected and approved soil treatment termiticide. The Contractor shall provide a 5-year written warranty against infestations or re-infestations by subterranean termites of the building constructed under this contract. Warranty shall include annual inspections of the building. If live subterranean termite infestation or

subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall: a. Re-treat the soil and perform other treatment as may be necessary for elimination of subterranean termite infestation, b. Repair damage caused by termite infestation, and c. Re-inspect the building approximately 180 days after the re-treatment. Soil treatment termiticides shall be currently registered by the EPA. Manufacturer's label and Material Safety Data Sheet (MSDS) for pesticides proposed for use shall be submitted to the Contracting Officer for approval, prior to application.

4-2 **EROSION AND SEDIMENT CONTROL.** Erosion and Sediment Control Facilities shall be required in accordance with the Virginia Department of Conservation and Recreation, as specified in the Virginia Erosion and Sediment Control Handbook (VESCH).

4-3 **DEMOLITION.** Existing facilities scheduled for demolition include but are not limited to Buildings T-135/135A, T-136, T-130, T-124/125/127 and associated structures and improvements to the MATES Complex. Demolition/removal of features described and/or shown shall include all above-ground and subsurface items and appurtenances including but not limited to structures, foundations, interior items/equipment, tanks, oil/water separators, pavements, and utilities. For bidding purposes, Offerors shall assume that all existing rigid pavements consist of an average of 9 inches of reinforced concrete, that Rives Road existing pavement consists of 4-1/2 inches of unreinforced concrete overlain with 1-1/2 inches of asphalt concrete, and that underlying materials suitable for reuse as base course will not be present. The following demolished materials, after removal of any contents and adhered materials, shall be transported to the Fort Pickett Recycling Center located within 5 miles of the project site and placed in separate designated piles, toremain the property of the Government: metal siding, structural steel, miscellaneous metal, and three (3) above-ground storage tanks, unless otherwise indicated or specified. All other demolished materials and materials not used in construction shall become the property of the Contractor and shall be disposed of off government property, except that excess clean soil and unreinforced concrete shall be disposed on post at the designated area located within 5 miles of the project site as selected by the Contracting Officer. All existing tanks and oil/water separators to be removed and/or demolished shall be properly closed, including all sampling and testing and submission of all appropriate records/documentation, in accordance with applicable provisions of the Virginia Administrative Code. The 2000-gallon concrete tank and (2) 275-gallon steel tanks to be recycled, as described herein and in Chapter 1, shall be carefully handled and delivered in an undamaged condition in order to be reused. Removed contents and all cleaning water/materials shall be properly handled, transported and disposed of off the Installation. See paragraphs 1-1.4 and 1-1.5 for additional demolition and environmental considerations and requirements. Obtain required demolition permits and disposal permits from the owner or agency having jurisdiction.

4-4 **CLEARING AND GRUBBING.** Clear and grub all trees and vegetation necessary for construction. All timber removed from the project site shall become the property of the Contractor, unless otherwise indicated or specified.

4-5 **WETLANDS.** Jurisdictional tidal and non-tidal wetlands have not been identified on the project site.

4-6 **EARTHWORK.** The contractor is responsible for defining earthwork requirements in the contractor provided site specific geotechnical report and for incorporating those requirements into the contractor provided final drawings and specifications. Concurrence of the geotechnical consultant and approval of the Contracting Officer shall be obtained for revisions to, or omission from the drawings and specifications of, any geotechnical report recommendation or requirement. In addition, all requirements contained in paragraphs 4-1.2 Soil Preparation and Compaction through 4-1.4 Soil Treatment of this Chapter shall be included verbatim within the contractor

provided specifications and/or drawings. These requirements shall be verified or betterments recommended by the consulting professional geotechnical engineer in the report wherever engineering, soils, or climatic factors indicate the necessity. Any modification to the stated requirements shall require the specific approval of the Contracting Officer prior to incorporation into the Final drawings and specifications.

4-7 **BORROW MATERIAL.** Obtain borrow material required for construction from sources off government property.

4-8 **WATER DISTRIBUTION SYSTEM.** The design of the water distribution system shall be in accordance with the Virginia Waterworks Regulations. Where the requirements of the agency having jurisdiction and the requirements defined herein disagree, the more stringent shall apply. The contractor shall determine the domestic and the fire demands for the facilities and shall verify the design of all components of the domestic and fire protection supply systems. Design of a water distribution system requires both domestic and fire flow demands be considered concurrently.

4-8.1 **Analysis of Existing System Capacity**. The contractor shall provide design calculations that validate the existing system is capable of handling the additional flows.

4-8.2 **Connections to Water Mains and Building Service Lines.** Specific connection location requirements are shown on the site plans. The contractor shall be responsible for the design of the means of connections to the existing system based on Facility requirements and system conditions.

4-8.2.1 **Connections to Water Mains.** Design the connections to the station water system including the meter assemblies and the necessary backflow-preventing devices. Fire protection system shall be considered as that part of the distribution system supplying fire hydrants, or fire hydrant laterals. Service connections supply water from the main to the building. Mains shall be looped with no dead ends and be of adequate size to satisfy both domestic and fire flow requirements. Minimum main size is 8 in. Sufficient sectional control valves shall be provided so that no more than two fire hydrants will be out of service in the event of a single break in a water main. The number of valves provided at junctions of mains shall be one less than the number of pipes entering at the junction. A copper tracer wire shall be placed directly above all non-metallic mains when plastic marking tape does not provide means of determining alignment of pipe by metal detecting equipment. The pipe, valves, and all other materials shall meet the requirements of the agency having authority for a 150 psi working pressure system.

4-8.2.2 **Building Connections.** Design and construction shall be in accordance with the International Building Code latest edition.

4-8.3 **Trenches.** Water and gas mains may not be installed in the same trench. Water mains shall have a minimum earth cover of 30 in. Adequate cover must be provided for freeze protection. Where frost penetrates to a depth greater than the minimum above, greater cover will be required. Sufficient cover must also be provided to protect the pipe against structural damage due to superimposed surface loads. Lines installed with less cover than the minimums stated shall be concrete encased with a minimum concrete thickness of 6 in.

4-8.4 **Fire hydrants.** Hydrants and valves shall conform to the requirements of the agency having jurisdiction. Fire hydrants shall be compatible with those presently in use at the installation, with similar pump and hose connections. The maximum amount of flow that can be permitted shall

be determined. Fire hydrant spacing shall be no greater that 500 ft apart by paved road. In addition, a hydrant shall be provided so that all parts of the facilities can be reached by hose lines not over 350 ft long. All distances shall be calculated along the closest route that the fire apparatus must travel (i.e.; along the curb or access lane). Each hydrant may account for a maximum of 1,500 gpm of fire protection regardless of existing pressures or water line capacity. A fire hydrant shall be located within 50 ft from any fire department connection provided. Hydrant laterals shall be 6 in minimum size, and shall not exceed 50 ft in length, and shall have an underground shutoff valve. Valve box, at each lateral, shall be located within 10 ft of the hydrant, and shall not be located where obstructed by parked vehicles, shrubbery, etc. Guard post barriers ((4) bollards) shall be provided where hydrant locations are subject to vehicle damage.

4-8.5 **Shutoff Valve.** Each building shall be provided with a separate service and main shutoff valve, readily accessible to maintenance and emergency personnel. Shutoff valves in walks are prohibited.

4-8.6 **Metering.** Water meters are required and shall be placed in approved vaults.

4-8.7 **Materials.** Materials for the water distribution system shall be in accordance with the AWWA and the agency having jurisdiction. Piping mains shall be ductile iron, bituminous coated, and cement mortar lined. Copper water service lines will be dielectrically isolated from ferrous pipe. Dielectric isolation shall conform to the requirements of AWWA. For ductile iron piping systems (except for ductile iron piping under floor in soil) conduct an analysis to determine if cathodic protection and/or bonded or unbonded coatings are required. Unbonded coatings shall conform to the requirements of the agency having jurisdiction. The water distribution system shall be provided with adequate thrust restraint. Restrained joints shall be designed by the contractor using DIPRA procedures. Thrust blocks shall be designed by the contractor and shall meet or exceed all Virginia Standards.

4-8.8 **Economic Analysis.** Conduct an economic analysis to determine if cathodic protection and protective coatings should be provided for the following structures in soil resistivity conditions above 10,000 Ohm-cm: ferrous metallic potable water lines; Concentric neutral cable; Other buried and submerged ferrous metallic structures not covered above; Ferrous metallic piping passing through concrete shall not be in contact with the concrete.

4-8.9 **Field Quality Control for Water Distribution.** The Contracting Officer will conduct field inspections and witness field tests specified. The contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete. Testing and disinfection procedures and requirements shall comply with the requirements of the agency having jurisdiction and State of Virginia Waterworks Regulations.

4-9 **SANITARY SEWERAGE SYSTEM.** The design of the sanitary sewer distribution system shall be in accordance with the Virginia Wastewater Regulations. Where the requirements of the agency having jurisdiction and the requirements defined herein disagree, the more stringent shall apply. The contractor shall determine the sewerage contribution for the facilities and shall verify the design of all components of the sanitary sewer system.

4-9.1 **Analysis of Existing System Capacity.** The existing system is capable of handling the additional flows.

4-9.2 **Calculate Sewage Contribution.** Calculate the sewage contribution from the new facilities in accordance with State standards for sewage contribution.

4-9.3 **Connections to Sewage Collection Mains and Building Service Lines.** Specific building connection locations are shown on the civil drawings issued with this solicitation. The contractor shall be responsible for the design of the sizes, and means of connections to the existing system based on Facility requirements and system conditions. Connect to gravity mains with a manhole.

4-9.3.1 **Building Sewer Laterals and Connections.** Laterals and building connections shall be designed and constructed in accordance with the International Building Code latest edition. Minimum diameter for laterals shall be 6 in while maintaining a minimum velocity of 2.5 fps. Minimum diameter for sewer force mains shall be 2 in.

4-9.3.2 **Main Collection Trunks.** Pipe sizes and slopes shall be calculated using the Manning Formula. Manholes are required at all changes of direction and spaced not more than 400 ft apart. Curved sewers are prohibited. Pipes shall be designed to flow full and maintain a minimum velocity of 2.5 fps.

4-9.4 **Trenches.** Sewer and water lines, mains or laterals, shall be placed in separate trenches. The separate trenches shall maintain a minimum lateral separation of 10 ft.

4-9.5 **Minimum Sewer and Water Distribution Pipe Separation Requirements.** Parallel water and sewer pipe and crossings between water and sewer pipe shall be in accordance with the Virginia Waterworks Regulations.

4-9.6 **Cover.** Sewer lines shall be located at a depth greater than the frost penetration. Coordinate with building connection requirements. To prevent the pipe from being crushed by construction vehicles and the design vehicle, the minimum cover above the top of pipes shall be 30 inches unless pipe materials are used and/or unless the pipe is concrete encased with a minimum of 6 inch thickness of concrete.

4-9.7 **Sewage Pump Station and Force Main.** Pump stations and force mains shall only be used when absolutely necessary. If required, pump stations and force mains shall be designed in accordance with the agency having jurisdiction and State of Virginia Standards. An on-site sewage lift station and force main shall be required. Sewage pump station shall be a duplex system. Pumps shall be submersible as manufactured by Peabody Barnes or an approved equal.

4.9.8 **Field Quality Control for Sanitary Sewer Distribution System.** The Contracting Officer's Representative will conduct field inspections and witness field test specified. The contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. For force mains, do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete. Testing procedures and requirements shall comply with the requirements of the agency having jurisdiction and State of Virginia Regulations.

4-9.9 **Oil/Water Separators.** The oil/water separator shall be designed and sized in accordance with the guidance in the "Joint Service Oil/Water Separator Guidance Document", available as Army Environment Center document SFIM-AEC-EQ-CR-200010.

4-10 **STORMWATER MANAGEMENT SYSTEMS - STORMWATER SYSTEM DESIGN.** The storm drainage system shall be properly coordinated with surrounding properties to ensure that runoff does not cause damage to other properties. Treat contaminated stormwater prior to discharge from the site. All storm water management calculations shall be based upon a 10-year storm frequency. Design storm water management systems in accordance with the applicable

requirements of the Virginia Erosion and Sediment Control Handbook 1992. The calculation of runoff and the evaluation of existing storm sewer drainage systems shall be as described herein paragraph entitled “Storm Drainage Collection Systems and Grading”. Obtain required permits from the agency having jurisdiction prior to construction. Stormwater System must comply with the provisions of VPDES Permit No. VAR540015.

4-10.1 **Analysis of Existing System Capacity.** The contractor shall provide design calculations that show the existing system runoff, and provide for control of increased runoff from the proposed improvements to the pre-development rate of discharge.

4-10.2 **Storm Water Retention/Detention System for Volume Control.** For volume control, an on-site storm water retention/detention system shall be required. The system shall be constructed of underground storage conduits (pipes).

4-10.3 **Storm Water Quality Management for Runoff Treatment.** For runoff treatment, an on-site storm water retention/detention system shall be required.

4-11 STORM DRAINAGE COLLECTION SYSTEMS AND GRADING.

4-11.1 **Location of Connections to Existing Systems.** The contractor shall utilize the existing drainage outfalls from the site as shown on the site plans. Connect with a manhole, junction box, or appropriate drainage structure.

4-11.2 **Building Connections.** Connection to building roof or area drain lines shall be designed and constructed in accordance with the International Building Code latest edition. Roof drain leaders shall be 8 inch minimum size when placed underground. Cleanouts are required at a maximum of 100 ft spacing.

4-11.3 **Storm Sewer System.** The storm sewer gravity drainage collection system shall be designed and constructed in accordance with the requirements of the Virginia Erosion and Sediment Control Handbook, and the VDOT Road and Bridge Specifications 2002. Storm sewer system shall be designed for a minimum of a 10-year return frequency and pipes shall be sized for full flow. The minimum velocity of flow in conduits during a design storm shall be 2.5 fps. The pipe capacity shall be determined so that the calculated hydraulic grade line of the storm sewer drainage system(s) shall not exceed the finished site grades.

4-11.4 **Manholes and Inlets.** Manholes or inlets shall be located at intersections and changes in alignment or grade. Intermediate manhole maximum spacing shall be 200 ft for pipes 30 inches or less in diameter or box drains with the smallest dimension less than 30 inches. Maximum spacing for intermediate manholes on larger pipes and drain boxes shall be 400 ft. Manholes and manhole appurtenances shall be pre-cast concrete ASTM C-478. Shape manhole inverts to the shape of the pipe with cast in place concrete after installing pipes. The manhole lid shall have a 24 inches. minimum opening as measured from the face of the wall or ladder where applicable. All manholes, drainage structures, and inlets shall be VDOT Standard.

4-11.5 **Drainage of Grass Areas.** Except at personnel and overhead doors, the difference in grade between the finish floor elevation and the surface of the ground immediately adjacent to the building shall be a minimum of 6 inch. Minimum slopes across grass surfaces shall be one percent. In grass areas, overland sheet flow shall be held to a maximum length of 100 ft; then, a swale or an

inlet must be used. Minimum slopes in swale centerlines shall be 0.5 percent. Maximum swale side slopes shall be 1V: 4H and maximum swale depth shall be 2 ft. Ditches shall not be permitted. Storm drain pipe, sheet flow surfaces, and swales shall be designed to prevent standing water under normal conditions.

4-11.6 **Drainage of Roads and Pavements.** Provide a positive crown in all streets and roads. Minimum cross slopes in streets and roads shall 1:48 and the maximum cross slope shall be 1:32. Minimum sheet flow slopes across parking area and other paved areas shall be 1 percent. Maximum slopes across hardstands shall be 1:20 (5 percent), and for gravel areas 1:12. Curbs and gutters shall be installed at a minimum longitudinal slope of 0.30 percent. Pavement collectors for storm water shall be by curb inlets and gutters, or drop inlets. Field inlets and an underground collection system shall drain open areas. Ditches shall not be permitted. Gutter spread (or inlet approach spread) in roads shall not exceed 10 ft when measured from the face of curb. The amount of runoff to any one inlet in roads and parking areas shall not exceed the capacity of that inlet. The maximum spread allowable for determining inlet capacity shall equal that allowed for gutter spread in roads. The maximum spread allowable for determining inlet capacity in parking areas shall be height of curb or a depth of 6 inches, whichever is less.

4-11.7 **Materials.** Pipe for culverts and storm drains may be of reinforced concrete or ductile iron with watertight joints. Pipe for underground retention system may be of reinforced concrete, corrugated steel, corrugated aluminum alloy, PVC, or HDPE. The system shall be capable of fully supporting an H-20 loading condition.

4-11.8 **Field Quality Control for Storm Drainage System.** The Contracting Officer's Representative will conduct field inspections. Testing procedures and requirements shall comply with the requirements of the agency having jurisdiction.

4-11.9 **Oil/Water Separators.** Oil/water separator shall be coordinated with paragraph 3.14 "Vehicle/Equipment Washdown Area". The oil/water separator shall be designed and sized in accordance with the guidance in the "Joint Service Oil/Water Separator Guidance Document", available as Army Environment Center document SFIM-AEC-EQ-CR-200010.

4-12 **PAVEMENT DESIGN CRITERIA.** Pavement design shall be in accordance with TM 5-822-6, Pavement Design for Roads, Streets, Walks, and Open Storage Areas. Additional guidance and recommendations are provided in the Geotechnical Report included as Attachment 8 to this Statement of Work. All apron areas shall be rigid pavement. Pavement for organizational vehicle parking (MOV) should be designed for the heaviest vehicle at the installation. Pavement for non-organizational vehicle (POV) parking shall be designed in accordance with Virginia Department of Transportation (VDOT) Road and Bridge Specifications 2002. Provide handicap parking areas where shown. Concrete curb shall not be required at the perimeter of all streets, roads, parking areas, and interior islands. Regardless of pavement design results, minimum pavement sections shall be as follows: For rigid concrete pavements the minimum section shall be 8 inch 4,000 psi concrete reinforced with 6x6 W2.9xW2.9 welded wire fabric over a minimum of 6 inch crushed stone base (VDOT Base Course) on compacted subgrade. POV (asphalt) pavement shall consist of 3 inch of SM9.5D surface mix over a minimum of 8 inches VDOT Aggregate Base Course on compacted subgrade. Recycled concrete, regardless of gradation or other test results, shall not be used for aggregate base course beneath asphalt pavement layers. Gravel pavement shall consist of a minimum 8 inch crushed stone, VDOT No. 25 in accordance with Section 205 of the VDOT RBS. Gravel shall be placed on a geotextile fabric over compacted subgrade. Design for Gravel Hardstands shall be in accordance with TM 5-822-12.

4-13 **PERMIT REQUIREMENTS.** Operating permits and licenses shall be the responsibility of the Contractor, in accordance with Section 00721, “Contract Clauses”. Timely acquisition of all the necessary design and construction related permits shall be the responsibility of the contractor. As some permit process times take 6 months or more, the Contractor, upon notice to proceed, shall immediately begin working on the permits so as not to delay completion of the project. The following permits have been identified as being required for this project: Health Department Permits for Sanitary Sewer and Water, Storm Water Management, Erosion and Sediment Control, National Pollution Discharge Elimination Service, Excavation Permit, Demolition Permit, Disposal Permit.

4-14 **EXTERIOR ELECTRICAL WORK.** All exterior electrical work shall be coordinated with the Fort Pickett Directorate of Public Works, the State Directorate of Information Management (DOIM) and the local power company, Southside Electrical Cooperative. Design analysis shall include meeting minutes of each coordination effort. All work shall be in accordance with ANSI/IEEE C2, National Electrical Safety Code and NFPA 70, National Electrical Code. Power distribution facilities shall be sized to support the installed demand load plus 20% spare capacity. All power, lighting and communications lines within the security fenced area bounded by Military Road, 7th, 8th Streets and Bakers Row shall be underground upon completion of work except as otherwise indicated.

4-14.1 Power Service. Electrical power supplier on the Fort Pickett Installation is Southside Electrical Cooperative (SEC). SEC owns and operates the primary electrical distribution system on Fort Pickett including 12.47/7.20 kV, 3-phase, 4-wire service lines (aerial and underground) and distribution transformers. Coordinate, arrange for, and pay all costs associated with the required demolition and provision of primary electrical service, including transformer equipment, by SEC for a complete and operable power system within the MATES Facility. Facilities to be provided electrical service include both new and existing facilities indicated. No additional payment will be provided to the Construction Contractor for provision of power service under this contract. Each SEC transformer must be provided with a transformer mounted kWh/kWD power meter for load tracking and observation (not revenue metering). Provide bollards around all poles, transformers, pedestals, etc to protect from vehicular damage.

4-14.2 Provide all low voltage service cabling and conduit between SEC transformer(s) and facility service equipment. Generally, provide each building with a single power service. 480Y/277 volt service should be used for principle building and facility loads. All power services to buildings and other exterior feeders shall be routed underground within the project site. All feeders routed below vehicular traffic areas, including concrete and gravel traffic areas, shall be run in concrete encased conduit. Underground feeders routed elsewhere may be direct burial.

4-14.3 Service entrance. Shall be in accordance with NFPA 70.

4-14.4 Transformers. Service transformers will be padmounted compartmental distribution type. Coordinate sizing, location and installation of transformers with SEC. Transformer location shall conform to UFC 3-600-01 for fire protection purposes. Verify transformer impedance and utility fault availability for purposes of determining available short circuit current at exterior and interior distribution equipment.

4-14.5 Area and Security Lighting. Provide lighting at entrances to buildings, at sidewalks,

POV parking and MOV parking areas and around buildings for safety and security. The entire site bounded by Military Road, 7th , 8th Streets and Bakers Row shall be illuminated. Minimum maintained horizontal illumination level shall generally be 0.3 foot-candles maintained at ground level with a uniformity ratio (average to minimum) of 8:1. Luminaires shall be actuated by a combination photoelectric/timeswitch control unless otherwise indicated. Luminaires shall be high-pressure sodium with vandal resistant lenses. Both pole mounted and building mounted luminaires may be used to achieve exterior lighting requirements. If high mast lighting poles are used to achieve lighting, those poles shall each be fitted with a luminaire lowering system. Provide one power operator for use by the Owner for lowering luminaries. Provide a power circuit at each high mast pole for connection of power operator. Maximum pole height shall be 90 feet. Provide 2 spare 1 ¼ " underground conduits paralleling each active lighting circuit for routing of future lighting power and signal circuits from servicing building to poles installed under this contract.

4-14.6 Provide all work necessary to temporarily service buildings and facilities during construction as indicated by the project phasing requirements. Replace power services to existing buildings within the Project area that are to remain where they interfere with construction or are presently overhead. Maintain power services to all buildings adjacent to project boundaries. Where services to buildings adjacent to the project area are affected by construction, restore such services to pre-construction conditions.

4-14.7 Provide power service for sanitary lift station and all other exterior facilities indicated.

4-15 **TELEPHONE**. Coordinate all telephone work with the Directorate of Information Management (DOIM) at Fort Pickett. Route all new exterior communications lines underground. Construct new facilities in accordance with ANSI/IEEE C2, National Electrical Safety Code and NFPA 70,National Electrical Code. New work shall conform to the following U.S. Department of Agriculture (USDA) RUS REA Bulletins:

345-39 PE-42 Telephone Section Protectors

1751F-643 Underground Plant Design

1753F-401 PC-2 RUS Standard for Splicing Copper and Fiber Optic Cables

345-72 PE-74 Field Splice Enclosures

IP 344-2 List of Materials Acceptable for Use on Telecommunications Systems of RUS Borrowers

1751F-641 Construction of Buried Plant

1753F-205 PE-39 REA Specification for Filled Telephone Cables

1753F-601 PE-90 REA Specification for Filled Fiber Optic Cables

ICEA S-80-576 Communications Wire and Cable for Wiring of Premises

4-15.1 Provide underground 100 pair #24 AWG CAT 3 backbone-cable between existing MATES Building 134 telephone service room and Building A Communications Room. Route cable above suspended corridor ceiling in new cable tray within the existing building. Exercise care to remove and reinstall ceiling tiles for tray and cable installation. Repair all damage to existing building finishes to match existing pre-construction conditions. Terminate all copper pairs on wall mounted distribution frame and 110 terminals at new and existing communication rooms. Provide 6-strand multi-mode fiber optic cable (FOC) from exist LAN Hub room in

Building 134 to Building A Communications Room. Route cable in new cable tray (along with new copper cable where routes coincide). Multimode fiber optic backbone cable shall meet the requirements of EIA ANSI/TIA/EIA-568-A and ICEA S-83-596 for 62.5/125 micrometer multimode graded index optical fiber cable. Terminate all FOC strands with ST type connectors on FOC patch panel at each end.

4-15.2 Provide underground 2-4" conduits stubbed out below grade from Building A Communications Room to a point 5'-0" beyond the Building A footprint or paved areas for routing of future service cables into the building. Provide 2-4" underground ducts (encase under traffic areas) from Building A communications room to buildings B, C, D communications rooms. Daisy chain arrangement (looping from Building A to B to C to D) is acceptable. Note that Building C is an optional bid item.) One of these 4" conduits shall have 4-1" inner-ducts for routing fiber optic cable. Provide 1-25 pair copper and 6-strand FOC service to each building B, C and D from Building A Communications room. Provide 1-2" underground conduit with 6-pair telephone cable between Building B communications room and Building E. Underground copper cable shall be manufactured per RUS REA Bull 1753F-205 PE-39 or RUS REA Bull 1753F-208 PE-89. A 8 mil coated aluminum or 5 mil copper metallic shield shall be provided. Fiber optic cable shall be specifically designed for outside use with tight or loose buffer construction. The tight buffer optical fiber cable shall consist of a central glass optical fiber surrounded by a soft intermediate buffer to allow for thermal expansions and proper fitting of the secondary buffer. The loose buffer optical fiber cable shall have the glass optical fiber within a filled loose tube. All fiber optic cables used shall conform to the requirements of RUS REA Bull 1753F-601 (PE-90) including any special requirements made necessary by a specialized design. All cable installers shall have a minimum of 3 years experience installing and terminating indicated copper and fiber optic cables.

4-15.3 Provide grounding per EIA/TIA –607. Provide cable testing for copper cables per RUS REA 1753F-201 PC-4. Provide FOC testing per EIA/ TIA-455-78A-98.

4-16 FIRE ALARM. Provide radio transmitter fully compatible and programmed to communicate with the existing Fort Pickett central fire reporting system. Existing reporting system is manufactured by King-Fisher. Connect transmitter to building fire alarm panel to report zoned fire and supervisory signals to the central fire reporting receiver. Coordinate zoning requirements with the Fort Pickett Fire Chief.

4-17 FUEL OIL STORAGE AND DISTRIBUTION Fuel oil storage and distribution system shall be installed to supply the fuel oil-fired heating equipment. Provide a complete fuel oil storage and distribution system designed in accordance with local codes, installation requirements, NFPA 30, and NFPA 31, whichever are more stringent. Tank size shall be determined using the ASHRAE Degree Day Method using the degree-days for the coldest 30-day period for the site.

4-17.1 Tank storage. Each building in the complex shall be provided with a separate fuel oil storage tank. Fuel oil storage tanks shall be located aboveground. Storage tanks shall be placed in a location suitable for filling from a curbside delivery truck. Fuel oil tanks shall be located in accordance with local codes, and shall be installed a minimum of 1-ft from the edge of the tank shell to the nearest outside wall of any building or from the nearest adjoining property line. Where tanks are located adjacent to exterior walls or other surfaces requiring

periodic painting or other maintenance/repair requirements, a minimum clearance of 3-ft from the edge of the tank is preferred. Proposed tank locations shall be clearly indicated in the design submittal.

4-17.1.1 Aboveground tanks. Fuel oil storage tanks shall be aboveground, double wall type with leak detection monitoring. Tank containment shall comply with applicable NFPA, EPA, and local code requirements. Provide concrete pads as required by code or as recommended by the tank manufacturer. Tanks shall be of the concrete encased design and shall be provided with protection bollards on all sides designed to prevent accident vehicle impacts.

4-17.2 Fuel oil piping. Underground fuel oil piping shall be of double-wall construction, installed without traps or sags. Outer, secondary containment pipe shall be non-metallic. Above ground piping shall be single-wall metallic pipe. Gate valves shall not be used in fuel oil piping systems. A replaceable filter shall be provided upstream of the fuel oil pump. Pipe connectors shall be in accordance with UL 567.

4-17.3 Not Used.

4-17.4 Special requirements.

4-17.4.1 Overfill prevention valve. The overfill prevention valve shall be placed within the tank interior and be an integral part of the fill tube. The valve shall be a float actuated shut-off valve. The valve shall be constructed of the same material as the fill tube. The valve shall have two stages of shutoff. In the first stage, the valve shall restrict the flow of fuel oil into the tank to approximately 5 gpm when the liquid level rises above 95 percent of the tank capacity. In the second stage, the valve shall completely stop the flow of fuel oil into the tank when the liquid level rises above 98 percent of the tank capacity.

CHAPTER 5

ARCHITECTURAL DESIGN

5-1 **DESIGN GOALS.** Overall architectural goals for the MATES complex are to provide a functional, visually appealing facility that is a source of pride for facility users, and the installation.

5-1.1 **Exterior Design Objectives**. Design buildings to present a consistent image on the installation relative to the existing main MATES building. Exterior materials, roof forms, and detailing shall be similar to the existing main building. Use durable, low-maintenance materials. Configure building massing and use exterior elements such as entries to provide human scale.

Building facades along 7th Street and Military Road (one face of Building D and two faces of Building A) shall be ground face concrete masonry full height to match the existing building. Remaining buildings and portions of buildings may be masonry, concrete or metal in a color to match the existing ground face cmu. These materials may be used in combinations to create attractive, durable facades.

Buildings may use load bearing masonry or steel frame or a combination thereof for a structural system. Exterior standing seam roof color shall match the existing roof. Programming plans of each building are provided as an attachment; windows, louvers, and doors shall be added as required by code, ventilation, function and aesthetic requirements. Proposed plans are to be similar to the programming plans in terms of space sizes and relationships.

5-1.2 **Interior Design Objectives**. The programming plans provide a functional layout for the spaces and buildings. For structural and construction purposes, the Proposer is allowed to vary the space arrangement and size up to 5% as long as functional and code requirements are met. Use durable materials and furnishings that can be easily maintained and replaced. Work bays and equipment/storage areas shall have cmu partitions (6” thick minimum, 8” or thicker in high bay areas) while administrative areas may have cmu or gypsum board on metal studs. Maximize use of day lighting and operable windows. Use interior surfaces that are easy to clean and light in color; avoid trendy or bright color schemes. Structure interior spaces to allow maximum flexibility for future modifications; (such as a change in authorized personnel).

5-1.3 **Material and Product Selection Criteria**. Materials shall meet the requirements of the SOW. The SOW includes a range of specificity: some material requirements are specific (no option); other material requirements allow a range of options. The SOW requirements establish a minimum quality level. Higher quality materials will be judged more favorably. The Offeror’s proposal shall identify the quality level of all major materials to be provided. Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturer of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening.

5-2 **APPLICABLE CODES AND STANDARDS**. Except as specified otherwise in the RFP, design and construction of facilities shall comply with the latest editions (as of the date of the

RFP) of the following. Major criteria references for building design are listed below; additional requirements are included throughout the RFP. Refer to Appendix A for a list of criteria references, and sources of availability.

5-2.1 National Fire Codes, published by the National Fire Protection Association (NFPA), including NFPA 101 Life Safety Code.

5-2.2 International Building Code (IBC).

5-2.3 Federal Std 795 Uniform Federal Accessibility Standards (UFAS), and Americans With Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG). Where these criteria conflict, the most stringent requirement shall apply.

5-2.4 Department of Defense Antiterrorism Standards for Buildings.

5-2.5 Fire Protection Engineering For Facilities, UFC 3-600-01

5-2.6 Unified Facilities Criteria- UFC 1-200-01 Design: General Building Requirements

5-3 **IBC OCCUPANCY AND BUILDING TYPE CLASSIFICATIONS**.

5-3.1 **General**. Occupancy classifications, construction types, allowable areas, maximum building heights, and fire separation requirements shall comply with the requirements of the International Building Code. The Occupancy is predominantly F-1 Factory Industrial-repair of motor vehicles, with incidental B and S. The “metal storage building” shall be a S- Storage occupancy. The buildings shall be one story in height and fully sprinkled with an approved automatic fire protection and alarm system. Building height shall be based on functional requirements. Construction type shall be Type 1 or 2. Fire separations shall be as determined by code including a separation from the existing building. For egress purposes, the building occupant load shall be calculated at 1 person per 100 square feet of gross building area.

5-4 **EXTERIOR DESIGN**.

5-4.1 **Acceptable Materials and Colors**. Exterior elements of the facilities shall comply with this Statement of Work and applicable codes.

5-4.2 **Exterior Walls**. Where masonry exterior wall finish material is used, and where allowed by code, concrete masonry or metal stud backup wall may be used. Metal stud backup may only be used in administrative/office type areas. Walls shall be cavity type with flashing and weeps.
Exterior insulation finish systems shall not be used.
Metal siding shall not be used below 16 feet AFF.

5-4.3 **Roofs**. Sloped roofs with a minimum pitch of 2: 12 shall be used on all buildings. Roofing color shall match existing. Roofing system shall have Underwriters Laboratory (UL) Class A rating for fire resistance, UL 90 wind resistance rating, and Factory Mutual (FM) 1-90 fire and wind resistance rating

5-4.3.1 **Exterior Non-entrance Doors**. Exterior doors and frames opening to spaces other than lobbies shall be hollow metal; comply with ANSI A250.8/SDI 100. Doors shall be Level

3, physical performance Level A, Model 2; insulated; top edge closed flush. Frames shall be Level 3, 14 gauge, with continuously welded corners and seamless face joints. Doors and frames shall be constructed of hot dipped zinc coated steel sheet, complying with ASTM A653, Commercial Steel, Type B, minimum A40 coating weight; factory primed. Anchors and accessories shall be zinc coated. Frames in masonry shall have bituminous back-coating, plaster guards, and shall be grouted solid. Fire-rated openings shall comply with NFPA 80, and the requirements of the labeling authority.

5-4.4 **Exterior Windows**. Provide aluminum windows complying with American Architectural Manufacturers Association AAMA/NWWDA 101 / I.S. 2. Minimum performance class shall be Heavy Commercial (HC). Minimum wind load, and resulting design pressure and performance grade shall be determined in accordance with the International Building Code (IBC). Windows shall be designed for force protection requirements including a load of 1 pound per square inch and a safety factor of 1.0. Provide windows with insulating glass and thermal break necessary to achieve a minimum Condensation Resistance Factor (CRF) of 45. Finish shall be Architectural Class I anodic coating or AAMA 2605 organic coating. Operable windows shall have locks; provide fiberglass or aluminum insect screens removable from the inside.

5-4.4.1 **Exterior Glass and Glazing**. To comply with force protection minimum standards: Single glazing and the inner pane of insulated glass assemblies in exterior windows and doors shall be minimum ¼" laminated glass. Provide tempered or safety glass as required by code.

5-5 **INTERIOR DESIGN**.

5-5.1 **Interiors.** Interiors shall focus on aesthetically pleasing durable design. See the finish schedule at the end of this chapter for minimum finishes. Where structural, mechanical, plumbing, and electrical items are exposed to view (such as in the work bays); the materials shall be installed in a neat, orderly, and consistent manner. All exposed items shall be painted.

5-5.2 **Partitions.** Partitions between spaces shall be full height and sealed to the roof deck/structure with acoustic or smoke or fire stopping sealant. Masonry walls/partitions in any space with an overhead door or accessible from a work bay shall be 8" cmu minimum with #5 vertical rebar 32" o.c. minimum.

5-5.3 **Signage**. Comply with requirements of ADAAG and UFAS. Provide changeable plastic laminate interior room identification signage for the following spaces: All interior rooms except General Purpose Bays. Provide painted metal signage for exterior doors except General Purpose Bays and Main Entrance Vestibule mounted on the entry door. Replace exterior wall mounted signage with a similar sign stating "MOBILIZATION AND TRAINING EQUIPMENT SITE" in painted cast bronze letters approximately 10" tall.

5-6 **PHYSICAL SECURITY REQUIREMENTS**.

5-6.1 **Anti Terrorism / Force Protection**. Compliance with Department of Defense Antiterrorism Standards (ATFP) for Buildings is not required for this building since it's occupant load does not meet the requirements for an occupied building or primary gathering structures. Some individual items have been specified in accordance with ATFP and the contractor shall provide these.
Louvers and exhaust fans on the exterior of the building less than 12 feet above finished

floor shall have deterrent to access- ½" diameter bars at 6" o.c. bolted, welded or grouted in place. All doors in the Lobby shall be lockable.

5-7 **WEAPONS VAULT**.

5-7.1 **Vault**. Unless more stringent construction features are required by life safety or building codes, minimum construction requirements shall be as follows:

5-7.1.1 **Floor**. 8" slab on grade; reinforced with minimum #4 bars 4 ½" o.c. each way, on vapor barrier, on 6" deep porous fill.

5-7.1.2 **Walls**. 8" thick cast-in-place concrete reinforced with #4 bars at 9" on center, each way, each face and staggered to form approximately a 4 ½" grid. Reinforcing shall be grouted into or cast in the slab.

5-7.1.3 **Ceiling**. 6" thick cast-in-place concrete reinforced with #4 bars at 6" on center, each way. Ceiling height of 10 feet.

5-7.1.4 **Door and Frame**. Class 5 vault door and frame complying with Federal Specification AA-D-00600C. Locks shall be Underwriters Laboratory listed Group 1 or 1R combination lock. Provide flush threshold. Comply with egress requirements of applicable codes.

5-7.1.5 **Penetrations**. Penetrations shall be minimized. All openings or penetrations in floor, walls or ceiling greater than 6" in any direction shall be protected with welded steel ¾" rod spaced no more than 6" on center or equivalent protection.

5-7.1.6 **Arms Rack Anchor Rings**. Provide 3/8" diameter stainless steel bar bent into U-shape (25 mm inside radius) with 2" long 90-degree returns at ends of horizontal legs. Overall length shall be 5"; embed 3" of horizontal legs (open end) in concrete 51 mm 2" of U-shaped end will protrude from wall to provide anchorage for Government furnished and installed arms racks. Orient the projecting U-shape vertically, so that centerline of the U is 4'-0" above the floor slab. Provide anchor rings at 3'-0" on center along all walls inside the Vault.

5-7.1.7 **Ventilation.** Room shall be dehumidified but not necessarily heated or cooled. Use 1 ½" "Z Type" vent for emergency ventilation.

5-8 **CONTROLLED WASTE HANDLING**

Controlled waste handling shall be a free standing, pre-constructed building located at Buildings A, B, C, and D. The building shall be a minimum of 5' x 7', sized to store 6 or more drums, constructed of 12 gauge galvanized steel, epoxy paint finished, with a galvanized steel grating floor, full size sump, and pad locking heavy duty hinged door. As an alternative the building may be precast concrete with an architectural finish. The unit shall comply with all code requirements for storing oil and fuel related waste.

5-9 **PAINT BOOTH.**

The bay shall have lighting, heating, and ventilation independent of the booth.

Paint booth shall be a dry filtration, cross flow, prefabricated system. System shall be a complete and operational turnkey system complying with all regulatory requirements. Enclosure shall be a drive-thru function. See attachments for additional requirements.

5-10 **PAINT STRIPPING BOOTH.**

The bay shall have lighting, heating, and ventilation independent of the booth.

Paint stripping shall take place inside of the building in a booth. System shall be a complete and operational turnkey system complying with all regulatory requirements for stripping tracked and wheeled vehicles on all exterior surfaces. Enclosure shall be a drive-thru function. See Attachments for additional requirements.

5-11 **MATERIALS** All materials and products shall be installed in accordance with the RFP, code and the manufacturer's instructions. The following materials establish the standard for architectural materials and may be used in construction of the facility, additional materials may be required:

5-11.1 This section not used.

5-11.2 Site materials

Soil Treatment For Subterranean Termite Control. Soil shall be treated for termite protection below the slab and around the perimeter of the building. The pesticide applicator shall be state certified by the Environmental Protection Agency. Treatment shall carry a 5-year non-prorated warranty and include annual inspections and any required re-treatment during the warranty period.

5-11.3 Concrete

See structural requirements. Slabs (other than vaults) that require a minimum of 6" thickness shall have 6x6-8/8 or 4x4- 10/10 wwm; 8" slabs shall have 6x6-6/6 or 4x4- 8/8 wwm; 4" slabs shall have 6x6- 10/10 wwm. Concrete shall be a minimum of 4,000 psi.

5-11.4 Masonry

Concrete masonry units shall be ASTM C 90 and used as indicated on the plans, may be lightweight units, shall have grout filled cells, and shall be reinforced with joint reinforcing and steel bars as required. Concrete masonry lintel units shall be used over acceptable spans for openings in CMU walls. Masonry work shall comply with the Brick Institute of America and American Concrete Institute guidelines. Interior walls and openings shall have bull nose corners except at header courses over openings. Exterior masonry shall be anchored to the structure with galvanized adjustable wall ties secured to studs or masonry. Steel lintels shall be painted hot dipped galvanized steel. All masonry at windows and doors shall be flashed with a flexible metal flashing.
All masonry shall be certified at the production plant for compliance with efflorescence testing.

Architectural masonry units. Ground face exterior units shall be integral color, treated with an add mixture water repellant, and match the existing masonry.

5-11.5 Metals

Metal Framing

Metal studs and joist shall be 16 gage exterior walls minimum (20 gage

minimum interior partitions) meeting ASTM A 653, SS Grade 50. Studs shall be spaced 16" o. c. Design framing in accordance with AISI SG-673. Provide design data confirming gage and spacing. Deflection shall not be greater than L/240 for roof or walls. See the Structural Chapter for additional requirements.

Miscellaneous Metal

Pipe Guards shall be heavy duty 8" diameter x 48" tall galvanized steel pipe filled with concrete and domed at the top, and set 36" deep in 14" diameter concrete. Pipe shall be painted.

Access doors shall be galvanized steel and provided in walls and ceilings for all plumbing valves, cleanouts, and mechanical systems. Doors shall be painted to match adjacent surfaces.

Fire Extinguisher Cabinets shall be semi-recessed, stainless steel case and frame with a clear glass front. Cabinets and extinguishers shall be provided as required by code. Extinguishers may be wall mounted on a bracket in bays and service areas.

Miscellaneous Metal. All misc metal shall be hot dipped galvanized and painted where exposed to weather. Handrails and guardrails shall be standard weight round pipe. Al exposed fasteners shall be stainless steel. Exposed downspouts shall have painted cast iron boots extending at least 3 feet above grade.

5-11.6 Wood

Rough Carpentry

Wood blocking shall be pressure treated with preservative treatment. Wood shall be treated in accordance with AWPA C2/C9 for .40 pcf.
Plywood Backboards shall be ¾" exterior B-C grade plywood mounted vertically on walls.

Fire retardant treatment shall be provided where required (telephone backboards, etc.). Wood shall be treated in compliance with AWPA C20/C27.

Exterior Sheathing. Where exterior stud framing is used it shall be sheathed with a moisture resistant, fiberglass faces –gypsum sheathing board. All vertical joints shall be taped. Sheathing shall be covered with an infiltration barrier such as Tyvec. All openings shall be flashed with a rubberized membrane such as WR Grace Bituthane.

Finish Carpentry

Shelving shall be plastic laminate covered ¾" plywood unless otherwise indicated.

5-11.7 Thermal and Moisture Protection

Neither insulation nor vapor barriers/retarders shall be exposed to view inside of buildings.

Dampproofing

Dampproofing on masonry shall be fibrous asphalt, in accordance with ASTM D 4479.

Insulation

Thermal Insulation. Provide exterior wall, floor, and roof/ceiling assemblies with thermal transmittance (U-values) required to comply with code and this RFP. Insulation shall not be installed directly on top of suspended acoustical panel ceilings.

Perimeter slab insulation shall be unfaced preformed rigid polyurethane, ASTM C 591.

Vapor Retarder shall be provided below slabs, have a 0.2 Perm or less rating in accordance with ASTM E 96.and 40-pound minimum puncture resistance rating in accordance with ASTM E 154. Where wall insulation is un-faced, provide 6-mil polyethylene film. Provide vapor barriers in concealed space as well as open areas that meet flame spread and smoke development ratings as required by code. Vapor retarder shall not be exposed to view.

Metal Roofing

Roof system shall include the entire roof system in accordance width ASTM E 1592. The system shall be a complete standing seam metal roof system consisting of finished, factory formed panels, fasteners, slip sheet, insulation, vapor retarder, all accessories, components, and trim. Roof system shall have a non-prorated, no-leak warranty from the contractor for 10 years following final acceptance of the project. The installer shall be certified by the roof system manufacturer. Roofing system shall have Underwriters Laboratory (UL) Class A rating for fire resistance, UL 90 wind resistance rating, and Factory Mutual (FM) 1-90 fire and wind resistance rating. Roof panel and trim shall have no exposed fasteners. Roofs shall have snow guards located at entrances, exits and sidewalks (not at overhead doors) and shall be mechanically attached (without penetrations) to metal roof ribs. Provide soffit/ridge ventilation where required by the design. Vents through the roof shall not be on the front of the building.

Metal Roofing. Roof shall be standing seam metal roof. Provide manufacturers 20-year premium Kynar based paint (or approved equal) finish warranty. Color shall match existing roof on adjacent structure. Roof panels shall be Galvalume or approved equal metal. Seams shall be mechanically seamed.

Roof insulation may be polyisocyanurate conforming to ASTM C 1289, Type II. The aged R-value shall equal to that indicated in the RFP. Facings and sheathing shall be provided as required. ASTM C 991 Blanket insulation may be used where appropriate, but shall include vapor barrier and a metal liner panel so all insulation may be concealed. Insulation system shall be designed/installed to avoid thermal bridges.

Liner Panels where used shall be paint finished with the manufacturer's standard light colored paint. Material shall be Galvalume, 28 ga minimum. Equipment, conduit, or other materials shall not be attached directly to liner panels (attach to structure or sub-framing).

Metal Siding

Metal siding where used may be insulated panels or non-insulated with a

separate insulation system. Insulated panels shall be tongue and groove type, foam insulated, G90 24 ga minimum face panels with premium Kynar finish exterior and standard interior finish. Non-insulated panels shall be Galvalume 22 ga minimum with premium Kynar finish exterior and standard interior finish. Fasteners shall be concealed; batten strips shall not be used. Wall panels shall be full length without splices or end laps. Color shall be similar to the existing masonry color. Interior panel shall be painted with manufacturer's standard light colored paint system.

Metal Entry Canopy

Canopies shall match roof construction.

Skylights

Skylights shall be used in the work bays. The area of skylight shall be approximately 5% of the floor area in each bay. Skylights shall be clear or translucent polycarbonate or glass, insulated units in colored aluminum to match the roof. Where glass is used provide low-e and laminated glass. Where curbs are used, roof shall be cricketed and flashed for positive drainage. Installation warranty shall be included in the roof warranty. Material shall be warranted for 5 years after completion of the project.

Flashing and Sheet Metal

Trim and Flashing. Materials and colors shall comply with this RFP and match color of existing material. Gutters, downspouts, fascias, soffit, and trim shall be prefinished metal to match the roof; comply with SMACNA Architectural Sheet Metal Manual; provide 20-year manufacturers finish warranty trim and flashing shall be at least 26 gauge Galvalume metal or approved equal in compliance with ASTM B 209 with Kynar based paint finish or approved equal, smooth finish, with no exposed fasteners. Where soffits are used they shall be flush panels. Continuous wood backing shall support fascia. Metal trim and flashing shall be produced in the maximum practical lengths but in no case less than ten feet long. Trim shall be flat with no oil canning or waves. All exposed flashing must match the roof color.

Fire Stopping

Fire stopping systems shall be used where required by code to maintain the integrity of fire resistance rated walls, partitions, etc. All material shall be asbestos free. "F" and "T" fire resistance ratings in accordance with ASTM E 814 or UL 1479 shall be met.

Joint Sealant

Sealant. Sealants shall be compatible and as recommended by the manufacturer of the items being sealed. Sealant at masonry shall be a one or two part urethane and shall closely match the color of the material. Sealant at window and doorframes shall be a one or two part urethane and shall closely match the color of the frame material. Interior joint sealant shall be silicone and be clear or match the surface being sealed. Compatible primers and backer rods shall be used with sealant.

5-11.8 **Doors and Windows.** Typical door shall be 3'-0" x 7'-0" x 1 ¾" hollow metal in single leafs or pairs. Storefront shall be used at the Lobby entrance only.

Steel Doors and Frames-

Personnel Doors. Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated (R-5) hollow metal; comply with ANSI A250.8/SDI 100. Doors shall be Level 3, physical performance Level A, Model 2; top edge closed flush with continuous welds. Frames shall be Level 3, 14 gauge, with continuously welded corners and seamless face joints. Doors and frames shall be constructed of hot dipped zinc coated steel sheet, complying with ASTM A653, Commercial Steel, Type B, minimum A40 coating weight; factory primed. Anchors (minimum 3 per jamb) and accessories shall be zinc coated. Frames in masonry shall have bituminous back-coating, plaster guards, and shall be grouted solid. Fire-rated openings shall comply with NFPA 80 and 101, and the requirements of the labeling authority. Doors leading into work bays, offices, public spaces (not toilets, janitors, small storage rooms, communication, electric, mechanical rooms) shall have partial glazing. Doors leading to work bays and spaces with or without cooling shall be insulated and weatherstripped.

Interior Hollow Metal Frames. Comply with ANSI A250.8/SDI 100. Frames shall be Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed. Anchors and accessories shall be zinc coated. Frames in masonry shall have bituminous back-coating, plaster guards, and shall be grouted solid. Frames at masonry walls shall be grouted solid. Frames shall be wrap around type at all walls.

Fire-rated and Smoke Control Doors and Frames. Comply with International Building Code (IBC), NFPA 80, and requirements of labeling authority. Doors and frames shall bear labels from IBC approved testing laboratory. Comply with positive pressure testing requirements of IBC.

Aluminum Doors and Frames- See Finish/Door Schedule.

Entrance Doors. Doors opening to building corridors or lobbies shall be aluminum storefront doors and frames with Architectural Class I anodic finish or AAMA 2605 organic coating finish. Color shall match the existing bronze. Doors shall be minimum 1-3/4" thick. Fully glazed stile and rail doors shall be medium stile. Provide aluminum storefront systems that comply with wind load requirements of applicable codes. Framing systems shall have thermal-break design. Air infiltration shall not exceed 0.06 cubic feet per minute per square foot at 6.24 pounds per square foot in accordance with ASTM E 283. Water penetration shall not exist at a pressure of 8 pounds per square foot in accordance with ASTM E 331.
System shall be designed to carry the 1-pound per square inch ATFP load without failure.

Overhead Rolling (coiling) Doors

Overhead rolling doors shall be used at each bay as shown on the drawings. Doors are typically 14' tall except where otherwise indicated. Doors shall be 28' wide except where otherwise indicated. Doors shall be counterbalanced, rolling type, with interlocking insulated slats, complete with guides, fastenings, hood enclosure, brackets, weather stripping, guide seals, hood baffle, and operating mechanisms. Doors shall be certified as meeting the requirements of the design. See structural chapter for wind load requirements; doors shall be designed for 1.5 times the required wind load. Doors and all hardware shall be designed for a minimum of 10 cycles per day (15,000 – 20,000 life cycles).

Doors shall be mounted on the interior side of exterior openings.
Doors shall be constructed from double walled steel slats with a thickness of at least 18 ga. minimum R-6 insulation core, and galvanized in accordance with ASTM A653. Slats shall be factory paint primed and finish painted with the manufacturer's premium paint finish.
Wind load on exterior doors shall be determined based on code and local conditions. .
Doors shall have electric and manual chain operation or chain only as noted in SOW.
Doors shall have a safety device (reversing edge) that stops the doors from closing when objects are in the door opening.
Doors shall be capable of holding a partially opened position.
Door hood shall not project into the required clear floor space or operational space for equipment such as cranes.

Aluminum Windows

Exterior Windows. Provide aluminum windows complying with American Architectural Manufacturers Association AAMA/NWWDA 101 / I.S. 2. Minimum performance class shall be Heavy Commercial (HC). Minimum wind load, and resulting design pressure and performance grade shall be determined in accordance with the International Building Code (IBC). Provide windows with insulating glass and thermal break necessary to achieve a minimum Condensation Resistance Factor (CRF) of 45. Finish shall be AAMA 2605 organic paint coating. Windows must be designed and installed to carry the 1 pound per square inch ATFP load without failure. Windows shall be operable and include replaceable screens.

Door Hardware- Hardware shall be fire rated to match door requirements. Doors and hardware shall be designed for life safety. All personnel doors shall be lockable with key access. Overhead doors may use the chain/motor or an interior locking device. Doors and hardware shall be complete for their intended use. Drawings indicate basic door requirements; provide additional doors as required.

Exterior Door Finish Hardware.
Finish. Hardware finish shall be polished stainless steel or chrome plated non-ferrous metal.
Hinges. ANSI/BHMA A156.1; template, full mortise, heavy duty, ball bearing, minimum size 4 ½" x 4 ½ ", non-ferrous base metal, non-removable pins.
Locksets on Exterior Doors. ANSI/BHMA A156.13; mortise lockset series 1000, Grade 1, non-ferrous base metal, removable core. Provide Best Locks and cylinders. All locks/latches shall have lever handles.
Exit (Panic) Devices. ANSI/BHMA 156.3; heavy-duty touch-pad type, through-bolted mounting. Listed and labeled for panic protection based on UL 305.
Closers. ANSI/BHMA A156.4; series C02000, Grade 1, hydraulic, factory-sized, adjustable to meet field conditions. Provide for all exterior doors, all doors opening to corridors and as required by codes. At exterior doors to lobbies, corridors, mechanical rooms, janitor's closets, and storage areas provide overhead holders or closers with hold-open capability. Storefront doors shall have concealed closers. Exposed closers shall have covers painted to match hardware.
Auxiliary Hardware. ANSI/BHMA A156.16. Provide wall or floor stops for all

exterior doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.
Thresholds. ANSI/BHMA A156.21; non-ferrous metal. Provide at all exterior doors.
Weatherstripping. ANSI/BHMA A156.22. Provide at all exterior doors.

Interior Door Finish Hardware.
Finish. Hardware finish shall be polished stainless steel or chrome plated non-ferrous metal.
Hinges. ANSI/BHMA A156.1; template, full mortise; heavy duty, ball bearing on doors with closers; standard duty anti-friction bearing on doors without closers. Minimum size 4 ½" x 4 ½ ".
Locksets on Interior Doors. ANSI/BHMA A156.2; series 1000, Grade 1, non-ferrous base metal, removable core. Provide Best Locks and cylinders. All locks/latches shall have lever handles.
Exit (Panic) Devices. ANSI/BHMA 156.3; heavy-duty touch-pad type, through-bolted mounting. Listed and labeled for panic protection based on UL 305.
Closers. ANSI/BHMA A156.4; series C02000, Grade 1, hydraulic, factory-sized, adjustable to meet field conditions. Provide as required by codes and as indicated in the Finish/Hardware Schedule. Store front doors shall have concealed closers. Exposed closers shall have covers painted to match hardware.
Auxiliary Hardware. ANSI/BHMA A156.16. Provide wall or floor stops for all doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.
Sound Strip. ANSI/BHMA A156.6; non-ferrous metal. Provide as required for sound rated partitions/spaces.
Vision Panel. ANSI/BHMA A156.6.
Kick Plates. ANSI/BHMA A156.6; non-ferrous metal. Provide at all doors with closers and as required for door protection.
Threshold/Transition. Use floor finish transition strips when floor finish changes between rooms. Locate strip below door.

Keying. Keying shall be coordinated with the Owner Keying system shall match the installation standard using Best Lock cores. A grand Master keying system shall be used for interior and exterior locks at the facilities. Each private door shall have it's own individual keying. Provide 3 copies and 3 spare blanks for each key. All keys shall be stamped "Government Property- Do Not Duplicate". Provide a 150-hook key control cabinet for the Owner's locksmith. Label each key by room. Final keying and cores shall be sent to the Owner for his installation and not used or distributed by the Contractor. Secure areas shall not be master keyed. Contractor shall coordinate keying with the Contracting Officer Representative and Ft Pickett locksmith.

Glazing. Provide tempered or safety glass as required by code.
Exterior Glass and Glazing. To comply with force protection minimum standards: Single glazing and the inner pane of insulated glass assemblies in exterior windows and doors shall be minimum of 1/4-inch laminated glass. All exterior glazing shall be insulated low e, clear glass. Units shall conform to ASTM E 774, Class A.

Interior Glass and Glazing. Glazing in doors, sidelights and interior windows shall be a minimum of ¼" thick and meet the requirements of IBC and Life Safety Code. Interior glazing shall be Type I, Class 1, clear, tempered unless noted otherwise.

5-11.9 Finishes

Metal Framing

Metal Support Systems. Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading, but shall not be less than 20 gauge. Steel shall be galvanized coated in accordance with ASTM A 653, Z180 G-60. Maximum stud spacing: 16" on center. Provide galvanized finish at all exterior or "wet" walls. Provide loading calculations for all load bearing framing.

Gypsum Board

Gypsum Board. Comply with ASTM C 36. Minimum panel thickness: 5/8". Provide Type X panels in fire-rated assemblies. Provide moisture resistant panels at locations subject to moisture. Screws ASTM C 646. Drywall installation: ASTM C 840.

High Impact gypsum board shall be used in corridors when finish is not masonry. It shall resist a force of 250 foot-pounds in compliance with ASTM D 2394.

Gypsum Board Ceilings. Gypsum board or plaster ceilings shall be installed in accordance with the US Gypsum handbook. All gypsum board shall be at least 5/8" thick and supported on framing spaced no greater than 16" on center. Gypsum board shall not be finished with spray-applied texture.

Uniform Finish. All gypsum board surfaces shall be finished in accordance to GA 214 Level 5.

Cementitious Backer Units shall comply with ANSI A118.9. Where cementitious backer units are used, a moisture barrier shall be used behind the units.

Ceramic Tile

Ceramic Wall Tile. Smooth or textured glazed wall. Comply with ANSI A 137.1 and the recommendations of Tile Council of America (TCA) Handbook For Ceramic Tile Installation. Substrate for wall tile shall be mortar setting bed or cement backer board (gypsum board is not acceptable). Tile shall be standard grade and containers should be grade sealed. Tile shall be impact resistant with a minimum breaking strength for wall tile of 90 lbs in accordance with ASTM C 648. Wall tile shall be 4" x 4" or larger.

Ceramic Floor Tile. Impervious mosaic tiles with less than 0.5 moisture absorption. Tiles to be colored throughout with an unglazed, non-slip finish and cushioned edge; suitable for heavy traffic. Provide base of same or suitable material. Comply with ANSI A 137.1 and the recommendations of Tile Council of America (TCA) Handbook For Ceramic Tile Installation. Tile shall be impact resistant with a minimum breaking strength for floor tile of 250 lbs in accordance

with ASTM C 648. Floor tile shall be Class IV heavy traffic, durability classification as rated by the manufacturer when tested in accordance with ASTM C 1027 for abrasion resistance as related to foot traffic. Tile shall be standard grade and containers should be grade sealed. Provide marble threshold under doors where a ceramic tile floor meets a different floor finish. Floor tile shall be 2" x 2" or larger.

Porcelain Floor Tile. Tile shall be an impervious porcelain tile with granite look finish. Tile shall be at minimum 8"x8". Install on a thick mortar bed. Provide colored grout.

Installation. Showers shall be per TCA B414-99, shower ceilings shall be per TAC C311-99, floors shall be per TAC F112-99, and walls shall be per TAC W244-99 or W245-99.

Acoustical Ceilings

Ceiling Tile. Comply with EPA requirements in accordance with Section 01670 Recycled/ Recovered Materials. Acoustical units shall conform to ASTM E 1264, Class A.

Suspended Acoustic Ceilings. Ceiling grid shall be white painted aluminum. Acoustic panels shall be 2' x 2' x ¾" thick, reveal edge, fissured pattern, washable, white, through color panels.

Resilient Flooring

Vinyl Composition Floor Tile. Vinyl composition tile shall meet ASTM F 1066, Composition 1, Class 2 through color, 12" x12" x 1/8". Finish floor by cleaning per the manufacturer's recommendations and polishing with 2 coats of floor wax.

Resilient Base. Base shall be rubber, cove, 4" x 1/8", solid color, and roll stock. Outside corners shall be pre-molded.

Transition between floor finishes shall be below the doors. Transitions shall be stone at tile floors and metal at vinyl or carpet. Following installation protect all finishes from construction work.

Rubber Floor. A rubber floor shall be similar to ECOsurfaces brand ECOnights product, 36" x 36" x 3/8" tile, multi-colored recycled rubber flooring system. Seal as recommended by the manufacturer.

Carpet

Carpet. Loop pile, (cut pile as indicated in finish schedule) patterned, yarn dyed, tufted pile weight shall be 28.0 ounce per square yard. Finished pile height shall be .187" high, density 6,462 and 14 stitches per inch. Large dye lot capacity with clear, crisp colors. Primary backing shall be woven polypropylene and a high performance secondary backing system. Manufactured from permanent static control fiber, stain resistant, and direct glue-down installation is mandatory for limiting acoustical absorbency of floor surface. Transition strips shall be dark metal securely fastened to the slab.

Corner Guards shall be provided at all corridor corners. Guards shall be high

impact resistant aluminum with embossed rigid vinyl covers to match the wall finish.

Paint

Paint colors shall be selected by the Owner from the Contractors submittals. Paint shall not contain lead, chromate, asbestos or mercury.

Surfaces to be Painted. All unfinished surfaces and factory-finished surfaces exposed to the view of the public (wall, ceiling or roof mounted items) shall be painted. Walls shall be painted to 4" above the finished ceiling.

Coatings. All painted surface shall be primed and receive a minimum of 2 coats of paint. Finish coat shall provide complete coverage. Painted masonry shall also receive block filler after block has been cleaned and accepted by the Owner.

Types of Paint. The following types of paint shall be used where indicated.

Epoxy Paint-	Doors, frames, walls in rooms scheduled.
Exterior Alkyd Enamel-	Exterior doors, frames, misc. items UON.
Interior Alkyd Enamel-	Interior door frames and metal items UON.
Interior Latex Enamel-	All other interior surfaces.
Latex Block Filler-	Any masonry or concrete to be painted.
Interior Latex Primer/Sealer-	Interior gypsum, masonry, plaster surfaces.
Interior Oil Based Primer-	Interior metal surfaces.

Gloss levels. The following gloss levels shall apply to all surfaces-

Flat-	Ceilings.
Eggshell-	Walls, doors, misc. items.
Semi-gloss-	Handrails, guardrails, doorframes.

5-11.10 Specialties

Visual Communication Specialties

Whiteboard/Markerboard. Markerboard shall have a porcelain enamel writing surface and chalk tray. It shall be a factory assembled unit complete in one piece, without joints whenever possible. Frame and chalk tray shall be clear finish aluminum. Chalk tray shall extend the full length of the liquid markerboard. Markerboard shall include a map rail with a tackable insert and shall have map hooks with clips for holding sheets of paper. Dry erase markings shall be removable with a felt eraser or dry cloth without ghosting. Unit shall come complete with an eraser and four different color compatible dry erase markers. 48" high x 12' long.

Tackboard. Tack boards shall be ¼" thick cork on a plywood or masonite backer board in a clear anodized aluminum frame. 36" high x 48" wide.

Exterior Signage

Exterior sign shall be individual bronze dimensional letters located on Building A facade. Sin shall state "MATES" in approximately 16" high letters and "VIRGINIA ARMY NATIONAL GUARD" in approximately 12" high letters. Provide additional site signage for handicapped accessible parking and traffic control.

Interior Signage

Interior Signage. Provide interior room identification signage for all rooms with an interior personnel door. Provide gloss or matte finish plaques with slots in base laminate for insertion of changeable message strips. Provide Braille on public access rooms such as restrooms and classroom/break areas.

Toilet Partitions

Toilet Partitions. Solid polyethylene, floor supported. Reinforce panels to receive partition-mounted accessories.

Urinal Screens. Solid polyethylene, wall hung. Secure wall hung screens with 42" long, continuous flanges. Screens shall be manufacturer's standard size approximately 48" tall and 24" deep.

Metal Louvers

Wall louvers shall be extruded aluminum, storm proof louvers, finished to match the metal windows, and include insect screen. Intake louvers shall be located 10 feet above grade. Finish shall be Kynar based paint.

Toilet Accessories

Grab Bar. Grab bar shall be 18 gauge, 1.25" OD Type 304 stainless steel. Length and form shall comply with handicapped accessibility codes. Flange shall have mounting holes concealed. Grab bar shall have satin finish and peened non-slip surface. Installed bars on concealed blocking. They shall be capable of withstanding a 2.225 kN 500 lb vertical load without coming loose from the fastenings and without obvious permanent deformation. Space between wall and grab bar shall be 1.5".

Mirrors. Glass for mirrors shall be Type I, transparent flat type, Class 1-clear. Glazing quality q-1 ¼" thick conforming to ASTM C 1036. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness, which shall provide reflectivity of 83 percent glass, and shall be free of pinholes or other defects. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint and shall be baked in uniform thickness to provide a protection for silver and copper coatings, which will permit normal cutting and edge fabrication.
Framed mirrors over lavatories shall be 24" wide x 36" high in a polished stainless steel frame mounted on the wall with concealed and tamper resistant fasteners.

Paper Towel Dispenser. Scott Tissue Dispenser, roll towel, In-Sight-Lev-R-Matic #9706, Color: Smoke Grey.

Sanitary Napkin Disposer. Constructed of Type 304 stainless steel with removable leak-proof receptacle for disposable liners. Fifty disposable liners of the type standard with the manufacturer shall be provided. Receptacle shall be retained in cabinet by tumbler lock. Disposer shall be provided with a door for inserting disposed napkins, and shall be partition or surface mounted.

Soap Dispenser. Scott Tissue Dispenser, soap, 1000ml, In-Sight #92551, twin pack sani-fresh, push soap release, Color: Smoke Grey

Toilet Tissue Dispenser. Scott Tissue Dispenser, Escort JRT #9686, Color: Smoke Grey

Waste Receptacle. Surface mounted or floor receptacle. Reusable liner, of the type standard with the manufacturer shall be provided. Receptacles with push doors and door for access to the waste compartment shall have continuous hinges. Locking mechanism shall be tumbler key lock.

Shower Curtains and Rods . Rods shall be heavy-duty stainless steel pipe and brackets. Shower curtains and hooks shall be by the Government.

5-11.11 **Casework and Countertops**

Casework. All work shall comply with the latest edition of the American Woodwork Institute (AWI) Quality Standards for custom casework. Provide architectural cabinets complying with AWI Quality Standards, Section 400, Custom Grade cabinets.

Cabinets. Cabinets with chrome plated handles, self-aligning friction hatches, and concealed hinges for 180 degree opening. Doors shall be flush overlay type. Provide wall bracket hangers for flush to wall mounting. Wall and base cabinets shall be same type of construction and appearance. Fabricate with frame construction throughout. Frames shall be solid hardwood not less than ¾" x 1 ½". Ends, bottoms, tops, and partitions shall be hardwood plywood not less than ½" thick. Cabinet backs and drawer bottoms shall be a minimum of 3/16" hardwood plywood. Provide mortise and tendon, dowel joints and glue together to produce rigid unit. Finish all exposed edges of plywood with hardwood strips. Provide 3 ½" to 4" toe space with painted plywood or clear coated solid wood toe board. Provide one shelf per base cabinet and 2 adjustable shelves per wall cabinet. Shelves shall be ¾" hardwood plywood with edge bands and finished to match the cabinet. Cabinets shall not contain particle or fiberboard. Finish shall be oak hardwood with oak stain and clear matte urethane finish.

Countertops. Countertop and backsplash shall be constructed of ¾ inch plywood and shall be fully formed type with square edges using wood nose molding at counter edge and shall include an integral backsplash. Backsplash shall be not less than 3 ½ inches high. Edging and trim shall consist of plastic laminate cut and fitted to all exposed edges. End splashes of ¾ inch plywood shall be provided. Continuous sheets of longest length practicable shall be provided; straight counters shall be one piece. Joints, where required, in surface sheeting shall be tight and flush and held to a practicable minimum. GP50 plastic laminate shall be used. Plastic laminate shall conform to the requirements of NEMA LD 3 and plastic laminate adhesive shall be contact type applied to both surfaces. The post-forming plastic laminate shall not be bent to a radius smaller than the limit recommended by the plastic manufacturer.

Window Treatments

Mini-blinds. FS AA-V-00200, Type II, horizontal aluminum mini-blinds at all exterior windows, except windows and storefront in work bays, corridors and lobbies. Blinds shall have one-inch wide x .008-inch thick slats with anti-static, anti-microbial polyester baked enamel finish. Provide heavy duty 1" x 1-1/2" steel head rail, and tubular steel bottom rail finished to match slats. Ladders

woven or braided and ladder cords shall be polyester, ends fused with plastic tassel. Locate tilting device on left side.

Work Benches. Workbenches shall be constructed of ¾" B-C exterior plywood on a 2" x 6" frame on 4" x 4" post. Lumber shall be pressure treated. Workbench shall be 27" deep x 8' long x 34" high. Locate one bench in each approximately 32' x 32' bay.

Furniture Systems

Furniture system shall be GFGI.

5-12 Finish Schedule

ACT	Suspended Acoustic Ceiling Tile
CON	Concrete
CH	Minimum Ceiling Height or Clearance to Exposed Structural/Equipment
CMU	Concrete Masonry Unit
CT	Ceramic Tile
EP	Epoxy Paint
G M	Galvanized Metal
HC	Hardened Concrete
P	Paint
P EX	Paint Exposed Structure
P MG	Painted Moisture Resistant Gypsum Board
PT	Porcelain Tile
R	Rubber
RB	Resilient Base
VCT	Vinyl Composition Tile
Wall Mat	Wall Substrate Material
Wnsct	Wainscot

Space	Floor	Base	Wnsct	Wall Mat	Wall Finish	Ceiling	CH
Classroom	VCT	RB	EP	CMU	EP	ACT	10-0
Latrine/Shower/Locker	CT	CT	CT	CMU	EP	P MG	10-0
Physical Fitness	R	RB	EP	CMU	EP	ACT	10-0
OISM Office	VCT	RB	EP	CMU	EP	ACT	10-0
Fuel/Ignition Repair	HC	EP	-	CMU	P	P EX	14-0
BII Storage	HC	EP	-	CMU	P	P EX	10-0
Machine Shop	HC	EP	-	CMU	P	P EX	14-0

Canvas Shop	HC	EP	-	CMU	P	P EX	14-0
Vault	HC	-	-	CON	P	P CON	10-0
Calibration Room/Storage	VCT	RB	-	CMU	P	ACT	10-0
Glass Repair	HC	EP	-	CMU	P	P EX	14-0
Radiator Test/Repair	HC	EP	-	CMU	P	P EX	14-0
Bulk POL Storage	HC	EP	-	CMU	P	P EX	10-0
Bulk Storage	HC	EP	-	CMU	P	P EX	14-0
Steam Jenny	HC	EP	-	CMU	P	P EX	14-0
General Purpose Work Bay	HC	EP	-	CMU	P	P EX	14-0
Welding Shop	HC	EP	-	CMU	P	P EX	14-0
Wash Bay	HC	EP	-	CMU	P	P EX	14-0
Steam Rack	HC	EP	-	CMU	P	P EX	10-0
Paint Stripping Bay	HC	EP	-	CMU	P	P EX	16-0+
Paint Strip Storage	HC	EP	-	CMU	P	P EX	10-0
Media Storage	HC	EP	-	CMU	P	P EX	10-0
Paint Preparation Bay	HC	EP	-	CMU	P	P EX	14-0
Paint Bay	HC	EP	-	CMU	P	P EX	16-0+
Paint Storage	HC	EP	-	CMU	P	P EX	10-0
Paint Workroom	HC	EP	-	CMU	P	P EX	10-0
Lubrication Bay	HC	EP	-	CMU	P	P EX	14-0
Engine/Trans Test Cell	HC	EP	-	CMU	P	P EX	14-0
Electronics Bay	HC	EP	-	CMU	P	P EX	14-0
Body Shop	HC	EP	-	CMU	P	P EX	14-0
Facility Maint/Storage	HC	EP	-	CMU	P	P EX	14-0
Mechanical Room	HC	EP	-	CMU	P	P EX	10-0
Compressor	HC	EP	-	CMU	P	P EX	10-0
Electrical Room	HC	EP	-	CMU	P	P EX	10-0

Communications Room	VCT	RB	-	CMU	P	ACT	10-0
Unheated Metal Storage	HC	-	-	GM	P	P EX	14-0
Controlled Waste Handling	GM	-	-	GM	P	P GM	8-0
Vestibule	PT	PT	EP	CMU	P	ACT	10-0
Corridor	VCT	RB	EP	CMU	P	ACT	10-0
Janitor	HC	EP	EP	CMU	EP	P MG	10-0

Note:
Ceiling heights are minimums and may be higher to meet crane or equipment requirements.
Ceramic Tile (CT) wainscot shall be 4’-0” AFF except at showers where they shall be 8’-0”.
Painted wainscot (Wnsct) shall be approximately 4’-0” AFF.
Epoxy Paint (EP) base shall be medium to dark color painted base approximately 8” high.

CHAPTER 6

STRUCTURAL DESIGN

6.1 GENERAL. The criteria herein shall be used for loading, design and installation of the structural systems and foundations, including manufacturing, erection, supervision, testing, and quality assurance of the completed installation of the buildings. Calculations shall be prepared by a registered engineer and shall be independently checked and initialed by a second registered engineer. Calculations, drawings and specifications shall be sealed and signed by a Professional Engineer licensed to perform work within the Commonwealth of Virginia.

6.2 STRUCTURAL WORK. Consists of, but is not limited to, the design and construction of:

6.2.1 Building Foundations - Spread footings, piles, drilled piers or others as recommended by the geotechnical report.

6.2.2 Ground floor slab systems - Slab on grade, pile supported or framed over crawl space as recommended by the geotechnical report.

6.2.3 Load Bearing and Non-load Bearing Walls - Including masonry, concrete, or stud wall construction acting as primary vertical load carrying members and/or shear walls.

6.2.4 Vertical Framing Members - Including steel and concrete columns or masonry pilasters.

6.2.5 Horizontal Framing Members - Including roof and floor decks and diaphragms, roof and floor beams, joists and trusses.

6.2.6 Interconnection Details - Including all fastening requirements.

6.2.7 Special Conditions - Such as expansion, construction, control joints, and changes in floor levels.

6.2.8 Attachment provisions for architectural, mechanical, and electrical elements.

6.2.9 Site structures and foundations.

6.3 DESIGN CRITERIA. Structural loads (including dead, live, hydrodynamic, earth, vehicular, snow, wind, and seismic loads) and design shall be in accordance with the International Building Code 2000 (IBC) and all codes referenced therein. Classification for the buildings for importance factors is Category “I”.

6.3.1 Minimum Live Load Requirements:

a. Roof - 20 psf

b. Floor - 150 psf, except for vehicle bays

c. Vehicle Bays - Minimum design load of AASHTO HS-25 unless exceeded by actual vehicle loads. Design shall consider the effects of wheeled vehicles, tracked vehicles, construction equipment, missile launchers, towed howitzers, self-propelled artillery, tank chassis, tank turrets, infantry fighting vehicle chassis and turrets, and larger power generation

equipment that will use the facility. The actual design loads for these vehicles will be provided by the user at the first on-site design meeting.

6.3.2 Minimum concrete strength shall be 4000 psi for all slabs and footings.

6.3.3 Minimum floor thicknesses are given in Chapter 2. Provide thicker slabs if required by analysis.

6.4 SELECTION OF STRUCTURAL SYSTEMS. Structural systems shall conform to all applicable criteria and guidance as well as industry standards and commonly accepted methods of practice. Consider logical alternative foundations and framing methods when selecting an appropriate system. The following elements shall be evaluated and addressed:

6.4.1 Total Life Cycle cost effectiveness of the system.

6.4.2 Constructability.

6.4.3 Experience level of local contractors and labor force.

6.4.4 Availability and use of local materials.

6.4.5 Sustainable Design.

6.5 SPECIAL REQUIREMENTS - CRANES.

6.5.1 The effects of the bridge cranes and monorail crane shall be incorporated into the design of the structure. The 35-ton crane shall have a support system independent from the building framing system. All remaining cranes shall be supported by either the building framing system or an independent support system.

6.5.2 The crane systems and the structural support system shall be designed, installed and tested in accordance with the Crane Manufacturers Association of America, Publications 70 and 74, ANSI/ASME documents: B30.2, B30.11, B30.16, B30.17, HST-4, HMI 100-74, OSHA par. 1910.179, NEC (Article 610), and references therein. Most stringent requirements shall govern. Cranes shall be heavy duty, Class D. Sizes and hook height are provided in Chapter 2.

6.5.3 Crane manufacturer and installer shall have 5 years experience in building similar cranes. The crane manufacturer shall supervise installation. Provide 4 bound sets of operating instructions, maintenance manuals and spare parts information.

6.5.4 The following features shall be included in the cranes:

a. Geared limit switch.

b. Weston type load break.

c. Roving (traveling) NEMA 12 push button control for control of crane from the floor. This is necessary for safety and will allow the operator to move far enough away from the heavy loads being lifted so that if any failure happens the operator will be safe.

d. Overload cutoff.

e. Multiple speed frequency inverter control.

f. Speeds: Two Speed Hoist 18 FPM maximum and 2 FPM maximum. Two Speed Bridge/Trolley 85 FPM maximum and 10 FPM maximum.

g. True vertical lift.

h. Direct current hoist brake.

i. Travel limit switch.

j. Thermal protection (the frequency inverter has this).

k. Start-up and maintenance training for user.

l. Two-year warranty from acceptance.

m. Specify the crane that will require the least building height.

o. Rails on 20 and 35-ton cranes shall be ASCE rails or high strength steel bars.

p. Cranes and hoists shall be designed for ready-maintenance and replacement of parts.

6.5.5 The following features shall not be included in the cranes:

a. MIL -15317

b. Time delay or hoist breaks.

c. Rail clamps.

d. Spring bumpers (Use travel limit switches).

6.5.6 The frequency inverters shall provide the following capabilities:

a. Infinite speed selection between the maximum and minimum speeds selected.

b. Field adjustment to change speeds.

c. Diagnosis of problems by code numbers.

d. Elimination of plugging/reverse plugging.

e. Ramp up and down – speeds automatically increase/decrease slowly to the ultimate speed.

f. Capability to be by-passed so operations can continue.

g. Motor protection from thermal overloading, reverse plugging, and decrease electrical peaking demand from motor start-up.

6.5.7 Design and installation power and control wiring and equipment for cranes and hoists shall conform to NFPA 70 including Article 610, Cranes and Hoists. Hoist horsepower shall be based upon actual hoisting speed to raise rated load. Provide limit switches for hoist, trolley and bridge to limit travel in each direction. Size system current carrying components to limit voltage drop to maximums indicated in CMAA Specifications 70 and 74. Motors shall be designed specifically for crane and hoist duty and sized based upon indicated ambient temperatures, loads, service class and speed range. Provide runway grounding conductor.

6.5.8 Testing for acceptance – The Crane test shall be in accordance with ASME B30.2, Section 2-2.2. Cranes shall be static tested (vertical lift) to 1.25 of the rated capacity and shall be tested to 100% of rated capacity for moving tests. The tests shall be performed a minimum of 2 times.

6-5.9 Training : The contractor shall provide 8 hours of training on crane operations for each different capacity/type crane included in the project. Training shall be taught by qualified representatives of the crane manufacturer. Training shall cover all aspects of normal operations, typical operational problems and their resolutions, routine maintenance, recurring maintenance, and cyclical maintenance requirements. All materials and supplies required to support this training effort shall be provided by the contractor.

CHAPTER 7

THERMAL PERFORMANCE

7-1 **THERMAL CHARACTERISTICS**. Building construction shall conform to the requirements of ASHRAE 90.1-2001, except that the maximum heat transmission values (U-Values in Btuh/sf-F) shall be 0.16 for gross walls, 0.10 for walls, 0.03 for ceilings/roofs, and 0.07 for floors. The R and U values shall be calculated in accordance with ASHRAE methods.

7-2 **THERMAL INSULATION**.

7-2.1 Characteristics. Thermal insulation shall have a flame-spread rating and a smoke-development rating in accordance with IBC requirements. A vapor barrier shall be provided on the warm-in-winter side of exterior wall and ceiling insulation, except in humid areas as defined below. Polyurethane is allowed as an insulation material for slabs and outside concrete or unit masonry walls. It is prohibited as an injected insulation material in walls or floor cavities or within the building envelope.

7-4 **INFILTRATION**. To limit air infiltration (especially in humid areas), the core areas within the MATES will be sealed with an air infiltration barrier, installed in accordance with the manufacturer's recommendations. The core area envelope shall be caulked, gasketed, weatherstripped or otherwise sealed: around window and door frames, between wall cavities and frames, between walls and ceiling and roof, between walls and floors, at access doors and panels, at utility penetrations through walls, floors, and roofs, and at any other exterior envelope joint which may be a source of air leakage. These steps shall constitute tight building construction.

CHAPTER 8

PLUMBING

8-1 **DESIGN STANDARDS AND CODES**. Plumbing system shall be designed and installed in accordance with the latest edition of the International Plumbing Code (IPC). Inspection and testing of the plumbing system shall be performed as prescribed in the International Plumbing Code. Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturer of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening.

8-1.1 Additional consideration in the technical evaluation will be given to systems which incorporate measures beyond the requirements of this STATEMENT OF WORK which are designed to increase energy conservation, ease of maintenance, or occupant comfort (such as water filtration and purification), higher efficiency water heating systems, higher grade plumbing fixture materials, etc.

8-1.2 System design and installation must conform to the following mandatory energy and water conservation criteria: Title 10 CFR Part 434.

8-2 **DESIGN CALCULATIONS**.

8-2.1 Hot water heater calculations. Design shall be based on the methods described in the American Society of Plumbing Engineers (ASPE) Volume I, Fundamentals of Plumbing Design. Submit calculations for determining storage capacity and recovery rate. A separate hot water heater is required in buildings A, B, C and D. Hot water storage tank temperature should be maintained at a minimum of 140 degrees F. Hot water delivered to plumbing fixtures shall not exceed 120 degrees F.

8-2.2 Water piping. Design shall be based on the International Plumbing Code for domestic water, sanitary waste and vent piping. All water piping shall be sized in accordance with methods outlined in the International Plumbing Code, to limit water velocity in the pipe to 8 ft/sec unless a lower velocity is recommended by the plumbing fixture manufacturer(s). Piping shall be sized to supply adequate pressure for prolonged usage, especially at points such as showers, bay access points and wash racks. Connection points for heavy-duty commercial washers and dryers shall be provided in the maintenance bay areas of buildings A, B, C and D. An isometric diagram of the water system shall be included in the design submittals. An isometric diagram of the sanitary sewer system, including appropriate venting, shall be included in the design submittals.

8-3 **EQUIPMENT**.

8-3.1 Water heaters shall have round, glass-lined tanks, and shall be installed with an integral insulating wrap with a minimum R-value of 5. Access shall be provided in the wrap for service and maintenance openings. Storage water heaters that are not equipped with integral heat traps and having vertical pipe risers shall be installed with heat traps directly on both the inlet and outlet. Circulating systems need not have heat traps installed. The water heater relief drain shall be manufacturer approved, and shall be indirectly connected to the building sanitary sewer system. Water heaters shall be sized in accordance with paragraph 8-2.1 for a 90 degrees F rise. Water heater energy factors shall meet or exceed the minimum requirements of 10 CFR Part 434 and shall be Energy Star labeled or have a minimum of 80% efficiency.

Additional consideration in the technical evaluation will be given to designs that include water heaters that exceed the minimum energy efficiency requirements. Units shall be UL listed. Contractor shall include 4 hours of training on the operation and maintenance of all domestic water heaters included in the project.

8-3.2 Pumps. Recirculating pump for domestic hot water shall be inline type and shall be provided whenever hot water piping extends further than 100 feet from the water heater tank. Expansion tank is required when using recirculating pump.

8-4 FIXTURES

The following fixtures will be acceptable for the facilities on this project except where noted otherwise for specific buildings. Provide handicap accessible type as required by Uniform Federal Accessibility Standards (UFAS). Fixtures shall be water conservation type, in accordance with the International Plumbing Code. Fixtures shall be provided complete with fittings, and chromium- or nickel-plated brass (polished bright or satin surface) trim. All fixtures, fittings, and trim in a project shall be from the same manufacturer and shall have the same finish.

8-4.1 Vitreous china plumbing fixtures shall conform to ANSI A112.19.2, Vitreous China Plumbing Fixtures. Stainless steel fixtures shall be in accordance with ANSI A112.19.3, Stainless Steel Plumbing Fixtures (residential design). Enameled cast iron plumbing fixtures shall comply with ANSI A112.19.1, and enameled steel fixtures shall comply with ANSI A112.19.4.

8-4.2 Exposed traps shall be chromium-plated, adjustable-bent tube, 20-gauge brass. Exposed traps for handicap lavatories shall be provided with PVC covers. Concealed traps may be plastic (ABS).

8-4.3 Water flow shall be no more than 2.5 gpm from any faucet. Lavatory faucets shall be the automatic sensor type, hard-wired. Gooseneck spout type shall be provided for handicap accessible fixtures.

8-4.4 Reduced pressure backflow preventer shall be provided in the building water supply main. A separate backflow preventer shall be provided for the sprinkler water supply main. Backflow preventers shall be provided for the makeup water supply for both the hot water heating system and the chilled water system.

8-4.5 Piping shall be run concealed to the greatest extent possible. When piping must be run exposed, it shall have clear identification to indicate function. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures except showers. Isolation shutoff valves shall be provided for each bathroom group.

8-4.6 Water closets. Water closets shall have elongated bowl, close coupled siphon jet, wall-mounted or floor-mounted, open-front seat, and a flush valve. A wax gasket should be used for floor-mounted water closets, if a floor discharge is used. A neoprene gasket should be used for all rear discharge water closets. Flush valves shall be the automatic sensor type, hard-wired. Water consumption shall be no more than 1.6 gal per complete flushing cycle. Water closet trim shall conform to ANSI A112.19.5, Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards). Floor or wall mounted water closets shall be water saver type and shall meet the requirements of the code. Water closets for handicapped usage shall meet UFAS requirements.

8-4.7 Urinals. Urinals shall be wall mounted and equipped with an automatic sensor type, hard-wired flush valve, and shall meet the requirements of the International Plumbing Code.

8-4.8 Lavatories. Lavatories shall be rectangular or oval, counter top type or wall-hung type, rectangular minimum 20 by 18 inches in size or oval minimum 19 by 16 inches in size. Lavatories shall be vitreous china except that counter top type may be enameled cast iron rimless type (without rings), or cross-link acrylic molded counter top with integral bowl. Lavatories shall have copper alloy or stainless steel strainer drains.

8-4.9 Showers. Showers shall be equipped with a combination valve and flow control device to limit the flow to 2.5 gpm at pressures between 20 and 60 psi. Shower faucets shall be provided with temperature sensing anti-scald devices.

8-4.10 Classroom sinks. Classroom sinks shall be Type 302 stainless steel, 20-gauge minimum, seamless drawn, and sound deadened. Sinks shall be double bowl, self-mounting without mounting rings, complete with cup strainer and plug.

8-4.11 Service sinks. Shall be floor mounted, standard size and meet the requirements of the code and be provided with vacuum breakers on the water supplies. Provide 1 service sink for every four bays with both hot and cold water. Waste of the service sinks must pass through an oil/water separator before connecting to the sanitary sewer system.

8-4.12 Electric water coolers. Units shall be electric refrigerated type and shall conform to the requirements of UFAS, ARI 1010 and the Lead Contamination Control Act of 1988.

8-5 **PIPING SYSTEMS**. Piping shall be run concealed to the greatest extent possible. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures except showers. Provide cathodic protection and pipe joint bonding systems as required.

8-5.1 Domestic water piping. Piping and fittings shall be copper tubing. Under slab supply piping shall be limited to service entrance only.

8-5.2 Copper tubing. Water piping under concrete slabs shall be copper tubing, type K, annealed. Joints under the slabs are prohibited. Interior pipe shall be type L or K hard-drawn copper. Fittings for hard-drawn to ANSI B16.22, Wrought Copper and Copper alloy Solder Joint Pressure Fittings.

8-5.3 Soil, waste, vent, and drain. Soil, waste, and drain piping and fittings shall be cast iron. Cleanouts shall be provided as required by the International Plumbing Code. PVC is allowable for vent piping only.

8-6 **MISCELLANEOUS ITEMS**.

8-6.1 Cleanouts. Cleanouts shall be provided at each change in direction of sanitary sewer lines, at the intervals specified in the International Plumbing Code, and at the building service entrance. All cleanouts shall be permanently accessible. Ground cleanouts shall be installed in a 12-inch by 12-inch concrete pad, flush with grade. Wall and floor types shall be provided as required by the code. Provide access panels or cover plates in exposed areas.

8-6.2 Wall hydrants/hose bibbs. Wall hydrants shall be provided at locations along the exterior of the buildings such that all lawn areas, trees, and plants can be watered with a 100 foot hose without crossing main entrances. Also provide a wall hydrant between every two bay doors. Wall hydrants shall be frost proof, and shall be supplied with an integral vacuum breaker. Provide hot- and cold-water hose bibbs on interior of vehicle bays at each wall area between doors to service the bays.

8-6.3 Floor Drains. All floor drains shall be deep seal type. Floor drains shall be provided in all mechanical rooms, all shower rooms, the Radiator Test and Repair room, and the Steam Rack.

8-6.4 Compressed Air Systems

8-6.4.1 Tool/Industrial Air Compressors and Receiver. Provide a packaged air compressor (rotary screw type) and receiver system located in each Mechanical room in buildings A, B, C and D. An aftercooler and moisture separator shall be installed between the compressor and the receiver to remove moisture and oil condensate before the air enters the receiver. The air compressor, receiver, and associated piping systems shall be sized to accommodate service in the bays of each building it supplies at 150 psi output pressure with a delivery of 90 cfm minimum at the farthest outlet. Provide two compressed air outlets for each bay installed in a wall mounted reel system. Separate air compressors shall be provided for supplying the paint stripping and painting facilities. Receivers shall be designed and constructed in accordance with ASME BPVC SEC VIII D1 and have a design working pressure of at least 200psi. An ASME Seal is required on the supplied receiver. Compressor shall be mounted with vibration isolation to eliminate transmission of vibrations to the facility.

8-6.4.2 Breathing Air Compressor System. A separate air compressor/receiver system shall be provided to provide breathing air in accordance with OSHA 29 CFR 1910.134 for Grade D Type 1 respirator equipment. Size of this compressor should accommodate a minimum of two people operating in the stripping booth and painting booth at the same time. Connections shall be unique to this system to prevent cross connection to the service air connections. Outdoor air intakes shall be filtered with a dry type filter having a collection efficiency of 99 percent of particles larger than 10 microns. be a minimum of 10 feet aboveground and 30 feet from any exhaust. Receivers shall be designed and constructed in accordance with ASME BPVC SEC VIII D1 and have a design working pressure of at least 200psi. An ASME Seal is required on the supplied receiver. Compressor shall be mounted with vibration isolation to eliminate transmission of vibrations to the facility.

8-6.4.3 Refrigerated Air Dryer. Compressed air systems shall include appropriately sized refrigerated air dryers.

8-6.4.4 Pre- and After-Filters. Provide pre- and after filters on the compressed air systems

prior to air distribution to the shops.

8-6.4.5 Compressed Air Piping.

8-6.4.5.1 Steel compressed air piping shall be Schedule 80 for sizes 2 and smaller and schedule 40 for sizes above 2 inches. Pipe shall be galvanized or black steel.

8-6.4.5.2 To the greatest extent possible the piping system in each facility shall be arranged as a closed loop or “ring main” to allow for more uniform air delivery. Pipes should be installed with lines parallel to the building lines. Traps will be required in low points and dead ends to remove moisture. All branch connections shall be taken from the tops of the mains. Contractor shall include sufficient isolation and shut-off valving in each system to allow pipe repairs or system alterations without requiring a complete shut-down of the compressed air system. All point of use connections for the compressed air system shall be made with standard “quick connect” type fittings.

8-6.4.5.3 A strainer (or filter) and lubricator is required for all tool use connections.

8-6.4.6 Controls. The compressor, air dryer, receiver, and other components of the individual compressed air systems shall operate under factory provided automatic controls. The components shall start/stop and cycle as required to adequately provide sufficient compressed air for all shop operations.

8-6.5 Emergency Shower/Eye Wash. One emergency shower/eye wash station shall be provided for each four bays and in the Paint Stripping room, POL Storage, and in the Painting booth.

8-6.6 Reel Systems. Between every two bays a wall mounted reel assembly shall be provided. Assembly shall consist of two compressed air reels, one water reel, one electrical power reel, and one electrical “lighting” reel. Hose/cable length from each reel shall be 50 feet minimum, compressed air and water hose shall be 3/8” min. All reel assemblies shall be factory assembled and tested and shall be provided complete with hose/cable, spring operated, with a ball stop. Air hoses shall be provided with quick disconnect fittings and water hose shall be provided with water bib cock. Reels shall be manufacturer’s standard products and shall be provided with a minimum five year warranty.

8-6.6.1 Reel Systems shall include all necessary piping, supports, connectors, etc. to provide a complete and usable system for the building occupants. Compressed air and water shall be provided with suitable isolation valves to allow individual reel replacement without disabling the entire facility. Electrical reels shall be provided with suitable means of disconnection from the power source.

8-7 **PIPE INSULATION.** Insulation type shall be cellular glass(CG) – ASTM C 552 – Type II and Type III, polyisocyanurate(PC),- ASTM C 591 – Type I, or phenolic foam(PF) – ASTM C 1126 – Type III.

8-7.1 Domestic service hot water piping. Minimum pipe insulation thickness shall be 1-1/2” CG, 1” PC, or 1” PF.

8-7.2 Domestic service cold water piping, refrigerant suction lines, chilled water piping up to 2”, and roof drain piping shall be insulated with a minimum of 1-1/2” CG, 1” PC or 1-1/2” PF with vapor jacket. Chilled water piping over 2” shall be insulated with a minimum of 2” CG, 1” PC, or 1-1/2” PF.

8-7.3 Air conditioning condensate piping inside buildings shall be insulated with a minimum of 1” PC or 1” PF with vapor jacket.

8-7.4 Hot water heating piping shall be insulated with a minimum of 1-1/2” CG up to 1” pipe size, 2” CG up to 4” pipe size, or 1” PC or 1” PF for all pipe sizes.

8-7.5 Interior Roof drain piping (if used). Provide 1-inch thickness insulation on all interior horizontal piping.

CHAPTER 9

ELECTRICAL SYSTEMS

9-1 **DESIGN STANDARDS AND CODES**. Comply with laws, ordinances, rules and regulations of local, state and federal authorities having jurisdiction and the rules and regulations of the National Board of Fire Underwriters, the National Electrical Code, ADAAG and the local power utility company (Southside Electrical Cooperative) requirements. Prepare and construct the design under the supervision of a Registered Professional Electrical Engineer.

Electrical systems, including, but not limited to, interior power, exterior and interior lighting, communication and signal systems, public address (PA) and cathodic protection shall be designed to comply with this chapter and the documents listed below to the extent referenced in this section. The publications are referred to in the text by basic designation only.

Provide drawings, specifications, design analysis and calculations as required elsewhere in this RFP for submittals for design proposals, and design after award.

Provide new electrical systems, complete and ready for operation. The design and installation of all electrical systems, including manufacturer's products, shall meet the instructions and requirements contained herein.

Electrical designs shall be economical, maintainable, energy conservative and shall take into account the functional requirements and planned life of the facility. Electrical designs shall also consider life cycle operability, maintenance and repair of the facility and real property installed equipment components and systems. Ease of access to components and systems in accordance with industry standards and safe working practices is a design requirement. All like equipment and accessories at a facility shall be from a single manufacturer. Electrical systems shall be designed to me the requirements of the ADAAG for barrier free accessibility.

Provide branch circuits, disconnect switches, magnetic starters, and all other related electrical equipment and material for all architectural, mechanical equipment and environmental equipment to be installed in the project (includes the buildings and site). This shall include all shop equipment, electric hand dryers, sensor operated plumbing fixtures, HVAC units, unit heaters, pumps, exhaust fans cranes and all other mechanical equipment in the facility. Contractor shall coordinate this electrical requirement with the architectural and mechanical requirements.

Electrical systems shall be installed to meet the appropriate seismic protection of the area, as required by UBC. Coordinate with structural designer.

Electrical installations in Paint Spray areas shall conform to NFPA 70, Article 516. Maintenance bay electrical installations shall conform to NFPA 70, Article 511.

The applicable recommendation standards, specifications, code and performances practices of the organization listed below shall govern all work and equipment.
NFPA - National Fire Protection Association
NEMA - National Electrical Manufacturers Association

IEEE - Institute of Electrical and Electronic Engineers
UL - Underwriter's Laboratory
IPCEA - Insulated Power Cable Engineers Association
FM - Factory Mutual
OSHA - Occupational Safety and Health Administration
NEC – NFPA 70, 2002 National Electrical Code
ADAAG – Americans with Disabilities Act Accessibility Guidelines

9-2 **DESIGN CALCULATIONS**. Provide calculations for the following:

9-2.1 Interior lighting. Provide calculations for each room or area. Data should identify target and calculated illumination levels for all typical rooms. Calculations should be adjusted to compensate for special applications such as irregularly shaped rooms, open sides, ceiling obstructions (beams, ductwork), corridors, etc. If the lumen method is used for corridor calculations, the calculations should be performed using a module in which the length does not exceed 3 times the width (2:1 ratio preferred).

Computations shall be based on the simple lumen method using coefficients of utilization corresponding to 80 percent ceiling and 50 percent wall reflectance factors in office type applications (white suspended ceilings and light colored unobstructed walls). The floor coefficient of utilization factor shall be 20 percent for most areas with dark carpeting or tile. Lower levels shall be used such as 50 percent/30 percent factors for applications with CMU walls, dark colors, irregular surfaces and/or structural obstructions. A maintenance factor of 0.7 shall be used for the typical application (this value shall be adjusted for non-typical applications - 0.75 or 0.8 for a well maintained office or lab with a filtered air supply, 0.65 for a mechanical and maintenance rooms with minimal maintenance).

9-2.2 Exterior lighting. Provide point-to-point calculations for all exterior lighting.

9-2.3 Perform Load Analysis for building to include connected and estimated demand. Separate loads by categories such as lighting, receptacles, HVAC, shop equipment, special equipment, etc.

Electrical loads for power system component sizing shall be calculated in accordance with NEC Article 220 for demand factors, in accordance with the direction below and in accordance with the NEC for design factors. Design factors are factors in the code such as continuous loads use 1.25 times the load and largest motor is times 1.25. EMD equals connected load times demand factor times design factor.

a. Incandescent Light Fixtures. Connected load shall be the sum of the lamp wattages. Use a demand factor of 80% to 100%.
b. HID and Fluorescent Light Fixtures. Connected load shall be the sum of lamp wattages and the ballast loss factors. Use a demand factor of 80% to 100%.
c. General use receptacles. Connected load shall be 180 VA for each receptacle with a maximum of six receptacles. Use demand factors per NEC Table 220-13.
d. Dedicated or Special equipment receptacles. Connected load shall be the nameplate rating of the equipment or it shall be the receptacle rating. Demand factor shall be 75% to 100%.
e. Fixed equipment. Connected load shall be the nameplate rating. Demand factor shall be 75% to 100%.

f. Electric kitchen equipment. Connected load shall be the nameplate rating. Demand factors shall comply with NEC Article 220.
g. Motors. Connected load shall be the nameplate rating. Demand factor shall be 80% to 100% and shall comply with Article 220.
h. Spares. Equipment such as transformers, panelboards, switchgear, switchboards, and motor control centers shall have 25% spare capacity. (Usable circuit space and spare load capability.)

9-2.4 Fault – short circuit calculations for electrical system. Infinite bus shall be used for available utility short circuit current. Transformer impedances shall be obtained from the Power Company. Fault current analysis shall be performed from the nearest upstream device in the existing source system of the utility company and extend through the downstream devices at the load end. All electrical system components shall be rated for connection and application at the calculated available fault current where the component is installed.

Low Fault-Levels. If the calculated fault current level falls to 14000 A.I.C. or less for 480 V systems or 10,000 A.I.C. or less for 208 V systems, no additional fault current documentation is necessary beyond that point in the secondary distribution system (assuming appropriate follow through in selection of equipment S.C. ratings).

9-2.5 Voltage drop – Provide calculations to verify voltage drops. Do not exceed limits as given in the National Electrical Code (NEC).

9-2.6 Panelboard feeders shall be rated to ampacity of panelboard mains. Where substantial computer, switch-mode power supply or inverter load is connected to feeder or associated panelboard, provide 200% size neutral.

9-3 **MATERIALS AND EQUIPMENT**. All materials and equipment shall be the standard catalogued products of manufacturers regularly engaged in the production of such equipment and material, and shall be the manufacturer's latest design. All equipment and material shall be specification grade, heavy duty and conform to the requirements of American National Standards Institute (ANSI), American Society of Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA), National Fire Protection Association (NFPA) or other national trade association as applicable. Where standards exist, materials and equipment shall bear the label and be listed by Underwriters Laboratories, Inc. (UL) or other recognized testing organization.

9-3.1 Space requirements. Electrical rooms shall be provided for all major electrical equipment. Space shall provide clearances and working areas as required by codes. Coordinate location to consider factors such as ease of maintenance, vicinity to loads being served and accessibility. Electrical, electronic and communication rooms and/or closets shall be separated from the mechanical rooms. Environmental control shall be provided in the communication room as needed to meet the equipment environmental requirements. All foreign piping and duct systems shall be prohibited from entering the electrical, electronic and communication rooms.

9-3.2 Wiring. Shall be copper and shall be run in conduit. Conduit shall be EMT, IMC or rigid steel type, except as otherwise required by NFPA 70. Do not use EMT underground or embedded in slab-on-grade. Rigid non-metallic conduit may be used in slab-on-grade and underground. Provide flexible conduit where required by NFPA 70. Minimum

conduit size shall be ½". Use solid conductors for sizes No. 10 AWG and smaller, and stranded conductors for sizes No. 8 AWG and larger.

9-3.3 Motors. Motors shall be high-energy efficiency type. Motors larger than one-third horsepower shall be three phase where available. Motors one-third horsepower and smaller shall be single phase. Motor starters for mechanical and special equipment will be furnished as an integral part of the mechanical or special systems.

9-3.3.1 Motor Efficiencies. Minimum motor efficiencies shall be either Energy Star or in accordance with DOE Buying Energy Efficient Products Recommendations (refer to www.eren.doe.gov/femp/procurement for recommended efficiencies). Applications, which require definite purpose, special purpose, special frame, or special mounted polyphase induction motors, are excluded from these efficiency requirements. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

9-3.4 Switchboard/panelboard. Dead-front construction, NEMA PB1 and UL 67. Circuit breakers shall be used in all switchboards and panelboards.

9-3.5 Exterior buried conduits for lighting and other loads shall be heavy wall schedule 80 PVC type, except, concrete encased conduits may be type EB.

9-4 GENERAL BUILDING ELECTRICAL DESIGN REQUIREMENTS

9-4.1 LIGHTING. Lighting design shall conform to the requirements noted herein.

9-4.1.1 Interior. Provide lighting that conforms to levels noted in below table for space functions listed and in accordance with Illumination Engineering Society (IES) recommended levels for other areas not specified.

SPACE FUNCTION	DESIGN FC LEVEL
Office/Administrative Areas/Library	70
Corridors/Hallways	10
Tool Room	50
Supply	30
Kitchen	50
Lobbies	15
Mechanical/Electrical Rooms	20
Communication Rooms	50
Storage Rooms	10
Toilets/Showers/Latrine	20
Equipment Rooms	20
Apparatus Bays/Battery Room	30
Instrument/Calibration	70
Fuel&Ignition/Radiator Test/Repair	70
Vault	20
Toilets	20
Machine Shop/Carpenter Shop	50
Injector Test/Engine Test	50
Canvas/Glass Repair	50
Welding/Body Shop	50

Wash/Steam	30
Paint Shop (strip, wash, spray)	70
Lubrication/Tire Shop	50
Transmission/Powerpacks	50
Work Bays	50
Break/Assembly	30
Unheated Storage Bldg	20
Physical Fitness	50

9-4.1.2 General Lighting Requirements: Recessed fluorescent light fixtures with T8, 32 or 34 watt lamps shall be used in all finished areas of the building unless otherwise noted herein. Fluorescent lamps shall have a color temperature of 3000 degrees Kelvin, color rendering index of 85 or more and an initial lumen output of at least 2900. Fluorescent light fixtures in offices and related areas, corridors, physical fitness, training rooms and calibration spaces shall use 3-lamp acrylic prismatic lens fixtures. Offices and Briefing rooms shall be provided with multi-level switching (0%-33%-66%-100%). Fixtures in other areas such corridors, restrooms, lobby, storage, etc. shall be 2 or 3 lamp fluorescent type fixtures. Fixtures in utility areas such mechanical rooms, electrical/communications room, storage rooms, and janitor's closet shall be industrial fluorescent type fixtures with open reflectors. Lamps in open industrial fixtures shall have protective tubes installed over the lamps. All ballasts shall be of the energy saving electronic type with power factor correction to exceed 90%. Low mercury "green type" fluorescent, compact-fluorescent, metal halide, and high-pressure sodium lamps/bulbs shall be installed when available in the proper size and type for the application. Ballasts shall have a total harmonic distortion (THD) less than or equal to 10% and shall operate at a frequency range of 25k -33k Hz. Dimmable lighting can consist of dimmable compact fluorescent light fixtures instead of incandescent.

a. Provide emergency light fixtures and exit lights in accordance with NFPA 101 requirements. Both shall have non-lead-acid type battery powered back-up, charge level meters and test buttons. Exit fixtures shall be of the LED type. Connect sufficient lighting fixtures in corridors, maintenance bays and similar traffic spaces for un-switched night lighting operation (approximately 10% normal illumination). Where HID lighting is employed as night lighting, those fixtures shall be equipped with quick strike quartz auxiliary to provide immediate lighting during HID lamp warm-up and re-strike. Alternately, provide a separate system of fluorescent night lighting fixtures in lieu of quartz re-strike auxiliaries.

b. All light fixtures, exit signs, egress light fixtures, etc., shall be of the heavy commercial grade.

c. Provide exterior building mounted luminaires (light fixtures) for general security by doors. Lamps shall be metal halide and sized to meet the lighting criteria and the most economical installation. Building entrances shall be lighted to a minimum of 0.2 foot-candles. Similarly, provide exterior illumination of the building perimeter. Fixtures will be photoelectric controlled with Hand-Off-Automatic manual override switch located at main electrical equipment space.

d. Fluorescent fixtures used in Communication Room shall use ballasts that have appropriate filtering to reduce RFI and EMI emission so as not to interfere with electronic equipment.

e. Occupancy sensors shall be used for locations such as administrative areas and toilets, where use would be intermittent and where control would generally be accessible to several individuals or functions. Passive configurations such as infrared sensors are to be used, unless the application is better suited to ultrasonic or dual technology (provide toilet and showers with ultra-sonic or dual tech type sensors).

f. Location of light switches shall be coordinated with the floor plan and furniture layout to ensure that they are easily accessible and convenient. Location shall be coordinated with the User.

g. Light switches shall be of the totally enclosed tumbler type and shall be ivory in color.

h. Provide lighting for maintenance purposes for all areas in which mechanical equipment is located including the outdoor mechanical equipment yard.

i. Lighting for unheated storage building shall be chain hung fluorescent fixtures with cold weather ballasts. Provide zone switching to promote energy conservation.

j. Lighting for maintenance bays and other high bay areas shall be suspended metal halide (MH) type. Provide quartz auxiliary in fixtures or other means to provide approximately 10% of normal illumination level when MH lamps are warming up.

9-4.2 POWER. Design and construct service lateral, service equipment and interior distribution system to fully support all facility loads plus 20% spare capacity. Use of 480Y/277V utilization voltage for major power and lighting with local step down transformers, 480-208Y/120V for small power/lighting loads is encouraged.

9-4.2.1 All circuits serving receptacle outlets shall be provided with a dedicated neutral conductor.

9-4.2.2 Lighting and receptacle outlets shall be on separate branch circuits.

9-4.2.3 A green equipment grounding conductor shall be provided for each branch circuit and feeder, regardless of the type of conduit. Grounding of power system components shall be in accordance with NFPA 70, Article 250.

9-4.2.4 Transient Voltage Surge Suppressor (TVSS) shall be provided for protection of entire facility at main service equipment. Unit features and protection characteristics shall be equivalent to Square D's XT Series surge protective device. Unit shall be externally mounted next to the buildings main service equipment.

9-4.2.5 Device plates for outlet bodies and light switches shall be impact-resistant plastic, ivory in color.

9-4.2.6 Receptacles. Receptacles shall be ivory in color. Mounting heights are measured to center of device.

9-4.2.7 Duplex receptacles for general-purpose applications shall be 20 amp, 125 volt, 2-pole, 3-wire grounding type. A maximum of six duplex receptacles may be connected to a receptacle circuit. Receptacle circuits shall not supply lighting loads. General-purpose duplex receptacles shall be located in the facility as follows:

a. Provide general duplex receptacles every 10' along the walls in all administrative and training areas of the building. For small rooms that do not have 10' walls, a minimum of one (1) outlet shall be installed on each wall. For areas other than admin/training, provide receptacles as indicated in Chapter 2, FUNCTIONAL AND AREA REQUIREMENTS of this RFP. Receptacles shall be mounted 15" above finished floor (center of device), unless otherwise indicated or required. In addition, the location of the outlets shall be coordinated with the interior design package (furniture layout) to ensure proper placement. Provide receptacles as follows for each maintenance workbay:

   4 duplex 125V receptacles
   1 single 250V receptacle
   1 28V DC receptacle (converter is not in this contract)
   1 heavy duty 125V receptacle cord reel
   1 exterior weatherproof GFI duplex power receptacle
   1 ground rod, ¾" DIA x 8'
   Receptacles or hardwire connection for washer and dryer

b. Provide a general-purpose duplex receptacle in each toilet. Receptacles shall have (GFI) ground fault interrupters. Mount receptacles 48" above finished floor.

c. Adjacent to all data/telephone jacks outlet locations, provide a general-purpose duplex receptacle for electronic equipment.

d. Dedicated receptacles shall be provided for all known placement of electronic, power and other similar equipment as noted in Chapter 2, FUNCTIONAL AND AREA REQUIREMENTS, of this RFP.

9-4.2.8 Special Receptacles

a. Weatherproof receptacles for exterior use, shall be mounted in a box with a gasketed, weatherproof, cast-metal cover plate and gasketed cap over each receptacle opening with (GFI). The receptacle shall be rated for use with or without the plug attached. Exact location of the receptacles noted below shall be coordinated with the USER during the design of this project. Provide 20 amp, 125 volt, 2-pole, 3-wire grounding type, duplex receptacles in the following locations:

b. Provide a duplex receptacle for each electric water cooler.

c. Provide dedicated receptacle for each government furnished and government installed copier and fax machine.

d. Provide a duplex weatherproof receptacle with ground fault interrupter on the exterior of the building adjacent to each exit and maintenance bay door of the building. There shall be a least one receptacle per main exterior wall. Mount receptacles 24" above finished grade.

e. Provide two (2) duplex outlets in each Communications Room. Outlets shall be 20A, 125 volt, duplex outlets with dedicated branch circuits. Two dedicated circuits shall be used in the Telephone Equipment Room. Receptacles shall be installed 15"above finished floor.

f. Computer outlets shall be duplex, 20 amp, 125 volt, 2-pole, 3-wire grounding type

receptacles. A maximum of four duplex computer outlets shall be connected to a branch circuit. Circuits shall be sized using 480 volt-amps per computer. Neutral conductors shall be sized at 133% of the phase conductors. Computer outlets shall be labeled as "COMPUTER". Mount the outlets 15" above finished floor except that data outlets in the maintenance bays shall be mounted on steel pedestal 24” above the floor. Receptacle outlets shall be mounted near the Telephone/Data outlets, but maintain a separation of 6" from the Telephone/Data outlets. Exact location of all Computer Outlets shall be verified and coordinated with the USER during the design of the project. Location of outlets shall be coordinated with the interior design package to include the furniture layout.

g. For sizing the transformers, feeders and equipment, the designer shall assume each staff member will have a personal computer. The nonlinear to linear power ratio shall be computed, and the power distribution system shall be designed accordingly. Special power requirements shall be provided to serve minicomputers as recommended by the using agency and the computer manufacturer.

h. Provide multi-outlet receptacle/raceway assembly above each test and workbench. Assembly shall be the full length of the associated bench and shall be fitted with a minimum of one duplex 20A-120V receptacle every 12”.

i. Provide a 110V clock outlet for each functional area except that maintenance bay areas shall be provided with one clock outlet for each four open bays.

j. Provide power connection for all equipment indicated in CHAPTER 2, FUNCTIONAL AND AREA REQUIREMENTS.

9-5 SPECIAL WIRING DESIGN REQUIREMENTS.

9-5.2 Electrical design of lighting, power, and communication systems shall provide for the functional features, equipment, and design requirements of the spaces described in Chapter 2, FUNCTIONAL AND AREA REQUIREMENTS, of this RFP.

9-5.3 Office Spaces. Offices shall utilize walls for power and communication outlets to the maximum extent possible. Open office spaces shall be served via an above ceiling wiring distribution system. This system will be a combination of conduit and tele/power poles. Power, data and communication cabling shall be provided to all Government Furnished/Government Installed (GFGI) system furniture.

9-5.3 General–purpose, 20-ampere wall-mounted duplex receptacles shall be provided throughout the facility (especially in corridors) for use by cleaning staff. Receptacles shall be located so that any point in all floor areas is within 20 feet of one of these receptacles. Also, provide exterior weather-proof GFCI 120V receptacles within 10 feet of all exterior doors and between each pair of apparatus bay doors on the exterior of the building.

9-5.4 Wiring shall be provided for automated plumbing fixtures and electric hand dryers where required by architectural design.

9-5.5 A spare 4” conduit shall be provided from the electrical room to a point 5’ outside the building perimeter. Conduit shall be sealed and capped with pull wire.

9-5.6 Contractor shall ensure that NEC requirements for working clearances and routing of piping around electrical equipment installations are met.

9-5.6 Provide electrical service for overhead cranes, air compressors, vehicle exhaust, paint/prep/spray equipment, breathing air systems and other equipment as indicated. See Chapter 2, FUNCTIONAL AND AREA REQUIREMENTS, of this RFP.

9-5.7 Provide one overhead electrical commercial/industrial 120V retractable power cord reels above each maintenance bay [38 total]. Cord shall be heavy-duty 3#12 AWG, 45 feet in length and fitted with a single 20A receptacle. A maximum of 2 cord reels may be connected to a single 20- ampere circuit.

9-5.8 Overhead Door Controls. Provide power and controls connection for overhead doors. Each door shall be operable from a pushbutton station wall mounted adjacent to the door.

9-5.9 Provide power service for two chargers in Battery Room. Interlock power service to battery room exhaust fan such that chargers cannot operate unless fan is operating. Provide audible device that will sound and alarm outside the battery room upon operation of emergency eyewash/shower.

9-5.10 Provide 120V power for HVAC DDC panel.

9-6 TELECOMMUNICATIONS. Contractor shall coordinate all communications requirements with the User and the Fort Pickett Directorate of Information Management (DOIM). Design shall conform to the requirements noted herein. The scope of work covered under this statement of work shall consist of the contractor furnishing all necessary engineering, labor, material, equipment, and testing to provide voice and data communication pre-wiring for support of information systems of the new MATES Facilities. The contractor shall be responsible for installation of all cable, outlets and connection hardware in accordance with all applicable ANSI/EIA/TIA standards. System shall be designed by a certified RCDD.

The government will perform:

1. Cross-connection of copper cables on termination facilities provided under this contract at the telephone service pedestal.
2. Provision of telephones sets, LAN and UPS equipment except as otherwise noted.

<u>Provide the following communication work:</u>

a. All unshielded twisted-pair (UTP) cable installed in accordance with 568-A EIA/TIA standard. Cabling and terminations shall be CAT 6.
b. Communications room with continuous climate control to protect installed equipment.
c. Telecommunication rooms shall be located to ensure that the maximum cable distance to an outlet does not exceed 295 feet.
d. All horizontal building distribution cable installed as a “home run” from the communications (COMM) room to work area (WA) outlet.
e. Where empty conduits are provided, provide with pull cord for future installation of cables.
f. Fiber Optic Connectors shall be “ST” type to maintain conformity to installation standard.
g. Provide and install a Light Interface Unit (LIU) for termination of all FOC strands at each building communications room. No strands will be left unterminated.
h. Provide one telecommunication cabinet, 7’H, 19”W rack for LAN. Provide one 96 port RJ45 to 110 patch panel in each cabinet. Provide one 24-port multi-mode fiber optic

patch panel for termination of outside plant fiber optic cable.

i. Provide dual outlets in the work areas for termination of horizontal cable. Outlets shall be dual 8-pin modular, RJ45.
j. Provide a 4-pair 24 AWG unshielded twisted pair, Category 6 UTP cable to all WA outlets. Pin/pair assignment shall be T568B. Terminate in accordance with ANSI/EIA/TIA 568-A standards. The contractor shall test and provide results for complete communication system per EIA/TIA standards.
k. Provide 2-4" underground conduits from Building A communication room to Building D Comm Room and in-turn to Building C Comm Room. Provide 2-4" underground conduits between Building A Comm Room and Building B Comm Room. Provide 1-2" underground conduit from Building B Comm Room to Building E. One of each pair of 4-inch conduits shall be provided with 4-1" inner ducts for routing of fiber optic cable. Provide one 25 pair copper cable and one 12-strand multi-mode fiber optic cable between Building A Comm Room and each of Buildings B, C and D.

9-6.1 Provide two plywood backboards 4'X 8'X ¾" and building protected entrance terminals with gas modules at each Comm room. Install 110-type with connection blocks at each communications room. All cable pairs and strands shall be terminated at both ends. All terminals shall include a minimum of 25% spare termination points. Paint backboards with two coats of white fire-retardant paint. Provide a #6 AWG copper ground at Communications backboards. Grounding system shall be in accordance with TIA/EIA – 607.

9-6.2 Inside Plant

9-6.2.1 Horizontal Cable Distribution

9-6.2.1.1 Provide cable tray in finished areas of buildings for distribution of cable. Extension of cable tray into maintenance bay areas is not required. NOTE: For cable tray, allow 1 in² per for cross section for each outlet served (i.e. 6" wide 4" can be used for 24 outlets). Cable runs should not exceed 295' from Communications Room to work area outlet. WA outlet runs shall be "homerun" type with no splicing. Cable trays shall be routed to optimize cable installation and future access.

9-6.2.1.2 Provide 1" electrical metallic tubing for each work area outlet to cable tray or communications room .

9-6.2.1.3 Provide work area (WA) duplex outlet boxes (4-11/16" x 4-11/16" with extension ring) with two RJ-45 module jacks for data and/or voice as indicated.

9-6.2.1.4 Provide two 4-pair 24 AWG, 100 ohm Category 6 copper cable, and unshielded twisted pair (UTP) to each outlet and terminated in accordance with EIA/TIA 568-A standard. All cable pairs shall be terminated at both ends.

9-6.3 Provide communications ladder type cable tray in Communications Room to provide means to route cabling to racks and wall mounted termination facilities. Provide ladder type cable tray system looped from communication room around the building above corridor accessible ceiling to serve all outlet locations. Extension of cable tray into maintenance bay is not required. Provide 1" electrical metallic tubing (EMT) to each outlet from cable tray or communications room for installation of house cable. Provide cable tray between existing Building 134 communications room and Building A communications room for support of backbone cables interconnecting telephone facilities in Building A and Building 134.

a. Telecommunication outlet locations. Locate system outlets as indicated on the drawings. Provide all administrative areas with a minimum of one duplex outlet at each workstation. One pay telephone outlet will be located as directed by the Contracting Officer at each building.

9-7 SPECIAL SYSTEMS.

9-7.1 PUBLIC ADDRESS SYSTEM (PA).
Provide a Public Address System including interior speakers, exterior weatherproof speakers, amplifiers, wiring, etc, for a complete and operable system. System shall provide complete coverage of Buildings A,B,C and D and their immediate exterior surroundings. Each building shall be a separate zone within the system. PA system will be connected to and accessed via the building telephone system.

9-7.2 INTRUSION DETECTION SYSTEM (IDS). Provide a ¾" empty rigid steel conduit system with device boxes for a Government Furnished/Government Installed (GFGI) J-SIIDS Intrusion Detection System in the vault at Building 147. GFGI system components will include control unit with data transmitter mounted within the vault, ultrasonic motion sensors to provide complete coverage of the vault interior, ultrasonic motion detector outside of vault aimed at vault door, balanced magnetic switch on vault door and exterior alarm sounding appliance. Design of this system shall be in accordance with NGB-MS Guide Specification, Joint Services Interior Intrusion Detection System. Coordinate location of conduit and device boxes with the local Security Officer.

9-7.3 EYE WASH STATIONS. Provide an audible alarm device to signal locally that eye wash unit has been activated.

9-7.4 CABLE TELEVISION. Provide one cable television (CATV) outlet in physical fitness room. Provide 1-1" empty conduit with pull wire from outlet to a point 18" below grade 5'-0 beyond building foundation for passage of cable by the CATV vendor. Provide wood stake to make conduit stub location.

CHAPTER 10

HEATING, VENTILATING, AND AIR CONDITIONING

10-1 DESIGN STANDARDS AND CODES. The HVAC design shall be in accordance with the current version of the International Mechanical Code.

10-1.1 Facility Energy Conservation Requirements. The entire facility design, including siting, building envelope, plumbing systems, lighting, electrical systems, and HVAC systems shall form a complete assembly/structure which is in compliance with ASHRAE 90.1-2001.

10-2 DESIGN CALCULATIONS.

10-2.1 Heat loss and heat gain calculations. Heating shall be provided to all spaces except the unheated Bulk Storage Building E. Cooling shall be provided for all office/administrative areas, electronics work shops, classrooms, fitness area, communications/Elect rooms, fuel/ignition shop, locker rooms and the calibration shop. Heating and cooling loads shall be in accordance with the current edition of the ASHRAE Handbook of Fundamentals. Computer-generated load calculations shall be provided, and shall include complete input and output summaries. Equipment shall be sized to meet the total load determined by computer calculation. Equipment may be oversized to no more than 115 percent of the computer generated load. Design shall be based on weather data from UFC 3-400-02, Engineering Weather Data; from ASHRAE Handbook of Fundamentals; or from other recognized and authoritative sources of weather data. Indoor design shall be in accordance with TABLE 10-1. Room air flow requirements shall be computed based on the individual room load. Values for internal cooling loads shall be included in the computerized load calculations in accordance with ASHRAE recommendations. Minimum space heating and ventilation shall be provided in spaces normally unoccupied, such as storage and equipment rooms. Any industrial ventilation requirement, other than that required per code or human occupant, may be considered process load when selecting supplemental heating equipment for the bay area.

TABLE 10-1 – INDOOR DESIGN DATA

Type of Design /Design Information	
Heating	
Indoor Design Temperature (Office, Lockers, Classroom/Break and Fitness areas)	**68 °F**
Indoor Design Temperature (Work Bays)	**55 °F**
Indoor Design Temperature (Shop areas, Test bays, vaults, and Calibration)	**60 °F***
Indoor Design Temperature (Storage areas)	**40 °F ****
Cooling	
Indoor Design Temperature (Office, Lockers, Classroom/Break and Fitness areas)	**75 °F**
Indoor Design Temperature (Electronics, Fuel/Ignition, Communications, Calibration)	**74 °F *** 50% RH**

* Missile Vault and Combat Arms Vault to be dehumidified to 50% +/- 5% RH
** Storage area heating to be based on 0 °F outdoor temperature
*** Electronics and Calibration areas shall be provided with humidity control to maintain relative humidity of 50 +/- 5%

10-2.1.1 Load design criteria. The internal loads shown in Table 10-2 shall be included for each space listed. The degree of activity shall be moderately active office work in offices/admin areas, communications rooms, and lockers. Use light bench work in shops. Use light machine work in fuel/ignition and fitness areas. Lights shall be included at the actual quantity provided. All relocated existing and expected normal equipment and tools and any additional equipment furnished under this contract shall also be included in the appropriate space.

TABLE 10-2 – INTERNAL LOADS

Space	People	Equipment
OISM /Asst Offices	1 each	1 PC/ person
Electronics Work Shops	3	1 KW / person
Classroom	7	2 PC's
Fitness Area	3	treadmill
Communication/Elect	2	1 KW/ person
Fuel/Ignition	3	1 KW / person
Locker Rooms	3	1 KW
Calibration	3	1 KW/ person

10-2.2 Ventilation air calculations. Calculations determining minimum outside ventilation air shall be provided for each building space. Ventilation rates shall be in accordance with the current edition of the International Mechanical Code. Outside air quantities will be sufficient to meet ventilation requirements and, for office type areas, maintain a positive pressure relative to the outdoors unless noted otherwise.

10-2.3 Exhaust air calculations. Calculations determining minimum exhaust shall be provided for each exhaust system. Exhaust rates shall be in accordance with the current edition of the International Mechanical Code.

10-2.4 Piping calculations. Calculations shall be provided for pressure drop calculations for all piping systems, including head loss calculations for all pumps.

10-2.5 Duct calculations. Calculations shall be provided for sizing all duct systems, including static pressure drop calculations for all fans. Ductwork layout drawings shall also be provided to indicate all fittings and devices to substantiate calculations.

10-3 MECHANICAL SYSTEMS. Each building shall be provided with a central heating system. Spaces within a building requiring air conditioning shall be provided with localized cooling systems, i.e. separate air handling units shall be provided for each Electronics Shop, the Calibration Shop, the Fuel/Ignition Shop, the Classroom, the OISM Offices, the Fitness Room, and the Communications/Elect area. Systems shall be designed, installed, balanced, and adjusted to distribute heat to all habitable rooms, as well as bathrooms, in proportion to the calculated load requirements of these spaces. Each repair bay shall be provided with a heating and ventilating system shall provide a minimum of 1.5 cfm/sf of filtered air that shall be tempered in winter meeting ICC – International Mechanical Code in addition to the unit heater heating system. The unheated storage building "E" shall be provided with thermostatically controlled ventilating systems suitable to maintain the space within 10F above ambient outside temperature. Each shop shall be provided with a heating and ventilating system providing a minimum of 2 air changes per hour. Additional consideration in the technical evaluation will be given to systems utilizing energy efficient equipment, additional space in the mechanical room, and other features which contribute to ease of system operation and maintenance. Additional

consideration will also be given to designs which provide measures to increase energy conservation or occupant comfort such as division of each building into more than one conditioning zone for increased control.

10-3.1 Air distribution systems. Cooling for OISM Offices, Locker Room and Classroom in Building B, C and D will be provided by split-system DX units or heat pump systems with the condensing/outdoor unit located in the ceiling space out of the tank traffic area. Cooling in Building A shall be provided by air handling units with chilled water coils. Heating in cooled areas may be provided by hot water coils in the air handling units.

10-3.2 Hydronic distribution systems. Provide pumped hot water piping systems with a standby pump provided for each system pump provided in each building. Hot water will be provided from central hot water system.

10-3.3 Heating only systems. For work bays and shop areas where heating only is required, provide unit heaters capable of delivering heat down to the floor level. Location of unit heaters shall be coordinated with cranes, lights, and equipment. In other areas heating shall be provided by unit heaters, fin tube radiation, cabinet heaters, or convectors. Units shall be hydronic.

10-3.4 Central heating equipment. Provide two #2 fuel oil fired hot water boilers located in the mechanical room for each building. Each boiler shall be sized for 60%-65% of the total building heat requirements including infiltration and ventilation, but in no case less than 1,250,000 Btuh gross output for each boiler in Building A, 1,000,000 Btuh gross output for each boiler in Building B, and 700,000 Btuh gross output for each boiler in Buildings C and D. Existing heating system in Building 147 may be extended for the new addition.

10-3.5 Central cooling equipment. Provide packaged air cooled chiller and direct expansion air cooled condensing units or heat pump outdoor units for cooling.

10-3.6 Exhaust systems. Provide individual ceiling mounted fans or central building exhaust systems for locker room and toilet exhausts. Provide individual thermostatically controlled exhaust fans for mechanical/electrical rooms and other spaces where ventilation only is required.

10-3.7 Ventilation systems. Provide ducted thermostatically controlled heating and ventilating systems capable of supplying 1.5 CFM/SF of filtered outdoor air for ventilating work bays, and 2 air changes for shop areas including the Paint Bay, Paint Preparation Bay, and Paint Stripping Bay in the summer. Outdoor air intakes shall be at least 10 feet above grade and shall be sized to prevent the entry of rain and water. Supply air registers/diffusers shall be designed to reduce stratification and deliver air to floor or bench level, especially at expected work station locations. Properly sized motor operated or counterbalanced relief dampers/louvers shall be provided. Ductwork location shall be coordinated with cranes, lights, and equipment location. See Chapter 5 for details on Paint Spray Booth and Paint Stripping Bay ventilation and heating requirements.

10-4 INCREMENTAL EQUIPMENT. The following equipment will be acceptable for the facilities on this project except where noted otherwise for specific buildings. Minimum equipment efficiencies shall be in accordance with DOE Buying Energy Efficient Products Recommendations (refer to www.eren.doe.gov/femp/procurement for recommended efficiencies) or Energy Star.

10-4.1 Dehumidifiers. Units for vaults shall be self-contained, refrigeration type with an adjustable built-in humidistat.

10-4.2 Unit heaters. Units shall be horizontal or vertical air discharge types complete with fans, hot water coils, housing and discharge vanes or diffuser. Size of heater and mounting height shall be carefully selected to direct heating down to floor level.

10-4.3 Fin tube radiation. Fin tube radiation. Units shall be complete with plate fin heating elements and enclosures. Enclosures shall be constructed of sheet steel not less than 20 gauge.

10-4.4 Cabinet heater. Units shall be complete with fans, heating elements and enclosing cabinets. Heating elements shall be constructed of cast iron or of nonferrous material. Cabinets shall be constructed of sheet steel not less than 20 gauge.

10-4.5 Convectors. Units shall be complete with heating elements and enclosing cabinets having bottom recirculating opening, manual control damper and top supply grille. Heating elements shall be constructed of cast iron or of nonferrous alloys. Cabinets shall be constructed of black sheet steel not less than 20 gauge.

10-5 AIR DISTRIBUTION TERMINAL UNITS. Minimum equipment efficiencies shall be in accordance with DOE Buying Energy Efficient Products Recommendations (refer to www.eren.doe.gov/femp/procurement for recommended efficiencies) or Energy Star.

10-5.1 Exhaust and supply fans. Fans shall be centrifugal type, inline type or roof or wall mounted, direct or V-belt driven with backward inclined, non-overloading wheel. Motor compartment housing shall be hinged or removable and weatherproof, constructed of heavy gauge aluminum. Fans shall be provided with birdscreen, disconnect switch, gravity or motorized dampers. Roof mounted units shall be provided with roof curb. Lubricated bearings shall be provided. Fans shall be tested and rated according to AMCA 210.

10-5.2 In-line fans. Fans shall have centrifugal, backward inclined blades, stationary discharge conversion vanes, internal and external belt guards, and adjustable motor mounts. Fans shall be mounted in a welded tubular or square casing. Air shall enter and leave the fan axially. Inlets shall be streamlined with conversion vanes to eliminate turbulence and provide smooth discharge air flow. Fan bearings and drive shafts shall be enclosed and isolated from the air stream. Fan bearings shall be sealed against dust and dirt and shall be permanently lubricated, and shall be precision self aligning ball or roller type. Fans shall be tested and rated according to AMCA 210.

10-6 AIR DISTRIBUTION CENTRAL EQUIPMENT. Minimum equipment efficiencies shall be in accordance with DOE Buying Energy Efficient Products Recommendations (refer to www.eren.doe.gov/femp/procurement for recommended efficiencies) or Energy Star.

10-6.1 Indoor air handling units. Units shall include fans, hot water and chilled water coils, airtight insulated casing, adjustable V-belt drives, belt guards for externally mounted motors, access sections for maintenance, combination sectional filter-mixing box, vibration-isolators, and appurtenances required for required operation. Air handling unit shall have published ratings based on tests performed according to ARI 430. All sections shall be constructed of a minimum 18 gauge galvanized steel, or 18 gauge steel outer casing protected with a corrosion resistant paint finish. Casing shall be designed and constructed with an integral structural steel frame such that exterior panels are non-load bearing. Casing may be of insulated double wall

sealed panel construction capable of withstanding 8-inch w.g. negative or positive pressures. Casings shall be provided with inspection doors, access sections, and access doors. Inspection and access doors shall be insulated, fully gasketed, double-wall type, of a minimum 18 gauge outer and 20 gauge inner panels. Drain pans shall be constructed water tight, treated to prevent corrosion, and designed for positive condensate drainage. Coils shall be fin-and-tube type constructed of seamless copper tubes and aluminum or copper fins mechanically bonded or soldered to the tubes. Coils shall be rated and certified according to ARI 410. Filters shall be listed according to requirements of UL 900. Filters shall be 2-inch depth, sectional, disposable type of the size indicated and shall have an average efficiency of 25 to 30 percent when tested according to ASHRAE 52.1. Filters shall be UL Class 2. Fans shall be double-inlet, centrifugal type with each fan in a separate scroll. Fan bearings shall be sealed against dust and dirt and shall be precision self-aligning ball or roller type. Bearing life shall be L50 rated at not less than 200,000 hours as defined by AFBMA Std 9 and AFBMA Std 11. Bearings shall be permanently lubricated or lubricated type with lubrication fittings readily accessible at the drive side of the unit.

10-7 CENTRAL HEATING EQUIPMENT. Minimum equipment efficiencies shall be in accordance with DOE Buying Energy Efficient Products Recommendations (refer to www.eren.doe.gov/femp/procurement for recommended efficiencies) or Energy Star.

10-7.1 Hot water boilers. Boilers shall be capable of burning #2 fuel oil. Boilers shall be designed, constructed and equipped in accordance with the ASME Boiler Pressure Vessel Code, Section IV, Heating Boilers. The boiler capacity shall be based on the ratings shown in HYI-01 or as certified by the American Boiler Manufacturers Association. Each boiler shall comply with Federal, state, and local emission regulations. Oil fired burners shall be atomizing, forced-draft type in conformance with UL 726.

10-8 CENTRAL COOLING EQUIPMENT. Minimum equipment efficiencies shall be Energy Star or in accordance with the following minimum efficiencies:

Minimum Efficiencies for Air-Cooled Chillers

	Full Load COP (EER)	IPLV COP (kW/ton)
Air-Cooled (with Condenser):		
150 tons or less	2.8 (9.5)	3.1 (1.12)

Minimum Efficiencies for Air-Cooled Condensing Units

Full Load Capacity	EER
65,000 Btuh or less	9.5
greater than 65,000 Btuh or less than or equal to 135,000 Btuh	10.3
greater than 135,000 Btuh or less than or equal to 240,000 Btuh	9.7

10-8.1 Packaged air cooled liquid chillers. Units shall be assembled, leak-tested, charged (refrigerant and oil), and adjusted at the factory. Chiller shall be provided with factory installed insulation on surfaces subject to sweating including the liquid cooler, suction line piping, economizer, and cooling lines. Chiller shall include all customary auxiliaries deemed necessary by the manufacturer for safe, controlled, automatic operation of the equipment. Chiller shall be provided with a single point wiring connection for incoming power supply. Factory installed insulation shall be provided on all suction piping from the evaporator to the compressor and on the liquid cooler shell. Where motors are the gas-cooled type, factory installed insulation shall be provided on the cold-gas inlet connection to the motor per manufacturer's standard practice. Compressors shall be scroll, reciprocating or rotary screw type. Scroll and reciprocating chillers shall be constructed and rated in accordance with ARI 590. Rotary screw chillers shall be constructed and rated in accordance with ARI 550 or ARI 590 as applicable. Chiller shall conform to ASHRAE 15. Refrigerants shall be one of the fluorocarbon gases. Refrigerants shall have number designations and safety classifications in accordance with ASHRAE 34. Refrigerants shall meet the requirements of ARI 700 as a minimum. Refrigerants shall have an Ozone Depletion Potential (ODP) of less than or equal to 0.05. Chiller shall be provided with a complete factory mounted and prewired microprocessor based control system. Controls package shall contain as a minimum a digital display or acceptable gauges, an on-auto-off switch, motor starters, power wiring, control wiring, and disconnect switches. Controls package shall provide operating controls, monitoring capabilities, programmable setpoints, safety controls, and EMCS interfaces. All exterior or chilled water piping exposed to freezing conditions during the winter months shall be provided with freeze protection system. Contractor shall provide pipe/equipment heat tracing or utilize an anti-freeze added circulating chilled water system.

10-8.2 Air-cooled condensing units. Condensing units shall be rated and tested in accordance with requirements of applicable Underwriters Laboratories (UL) standards including

UL 1995. Condensing units shall be rated in accordance with applicable ARI standards and shall include fans, electric motor and drive equipment, condensing coil, liquid receiver if required, enclosure with suitable access doors, and coil hail and damage protection. Enclosure shall be constructed of 18 gauge hot-dip galvanized steel, reinforced and braced. Access doors or panels suitably sized and located shall be provided for access to coils and valves for cleaning, repair, or removal of the item.

10-8.3 Manufacturer's multiyear compressor warranty. The Contractor shall provide a 5 year parts and labor (includes refrigerant) manufacturer's warranty on compressor(s). This warranty shall be directly from the manufacturer to the Government and shall be in addition to the standard one-year warranty of construction. The manufacturer's warranty shall provide for the repair or replacement of the compressor(s) that become inoperative as a result of defects in material or workmanship within 5 years after the date of final acceptance. When the manufacturer determines that a compressor requires replacement, the manufacturer shall furnish new compressor(s) at no additional cost to the Government. Upon notification that a compressor has failed under the terms of the warranty, the manufacturer shall respond in no more than 24 hours. Response shall mean having a manufacturer-qualified technician onsite to evaluate the extent of the needed repairs. The warranty period shall begin on the same date as final acceptance and shall continue for the full product warranty period.

10-9 AIR DISTRIBUTION SYSTEMS. Provide duct systems conforming to the recommendations of the SMACNA Duct Construction Standards including seal class requirements. Fire dampers shall be provided where required by code. Balancing dampers shall be provided at all branch takeoffs and for all supply outlets. Permanent access to dampers shall be provided. Air intakes shall be placed at least ten (10) feet above grade. Intakes shall be covered with screens to prevent insects and foreign objects from entering.

10-9.1 Ductwork. All ductwork including fittings and components shall conform to SMACNA HVAC Duct Construction Standards. Seal class shall be as recommended by SMACNA. Pressure sensitive tape shall not be used as a sealant. Ductwork leak test shall be performed for the entire air distribution and exhaust system, including fans, coils, filters, etc. Test procedure, apparatus, and report shall conform to SMACNA Leakage Test Manual. The maximum allowable leakage rate is 2%. Ductwork leak test shall be completed with satisfactory results prior to applying insulation to ductwork exterior.

10-9.2 Supply diffusers and registers. Diffusers shall be located to ensure that the air distribution will completely cover all surfaces of exterior walls with a blanket of conditioned air or may be of a compact design so long as 'dead spots' within the units are avoided. Diffusers shall be provided with integral opposed blade damper. Diffusers shall be provided with air deflectors as required for proper air flow in the space. Plastic diffusers are prohibited. Core velocity shall be limited to 600 ft/min maximum, with a maximum pressure drop of 0.1 in w.g. Ceiling mounted units shall have factory finish to match ceiling color, and be installed with rims tight against ceiling. Sponge-rubber gaskets shall be provided between ceiling or wall and surface-mounted diffusers for air leakage control. Diffuser boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Suitable trim shall be provided for flush-mounted diffusers. Duct collar connecting the duct to diffuser shall be airtight and shall not interfere with volume controller. Wall supply registers shall be installed at least 6 inches below the ceiling.

10-9.3 Return/exhaust registers and grilles. Grilles shall be fixed horizontal or vertical louver type similar in appearance to the supply diffuser face. Registers shall be provided with integral opposed blade damper. Plastic units are prohibited. Core velocity shall be limited to 400 ft/min

maximum, with a maximum pressure drop of 0.06 in w.g. Grilles shall be provided with sponge-rubber gasket between flanges and wall or ceiling. Register/grille boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Wall return grilles shall be located at least 6 inches above the floor or below the ceiling.

10-9.4 Flexible duct. Shall be limited to runouts, shall be adequately supported to prevent kinks and shall not exceed 10 feet in length. Runouts shall be preinsulated, factory fabricated, and conform with NFPA 90 and UL 181.

10-9.5 Fire dampers. Fire dampers shall be located and installed in accordance with NFPA 90A, and shall conform to the requirements of UL 555. Fire dampers shall be automatic operating, and shall be dynamic rated for the maximum system velocity and pressure. Fire dampers shall be equipped with a steel sleeve or adequately sized frame installed in such a manner that disruption of the attached ductwork, if any, will not impair the operation of the damper. Dampers shall not reduce the duct or the air transfer opening cross-sectional area. Access doors shall be provided at all fire dampers.

10-9.6 Balancing dampers. Provide in ducts serving each supply, return and exhaust air device.

10-9.7 Access doors. Provide in ductwork and plenums at all air flow measuring devices, automatic dampers, fire dampers, coils, thermostats and other devices requiring service and inspection.

10-10 HYDRONIC DISTRIBUTION SYSTEMS.

10-10.1 Pumps. Provide base mounted centrifugal pump with backup for each hydronic system provided. Provide flexible connections and pressure gauges on pump inlet and outlet.

10-10.2 Air separator. Provide air separator for each closed hydronic system provided.

10-10.3 Expansion. Provide a bladder type expansion tank for each closed hydronic system provided.

10-10.4 Chemical feed systems. Provide means for chemical treatment for each hydronic system provided. Provide initial treatment and one year supply of chemicals for each system provided.

10-10.5 Makeup water. Provide backflow preventers and pressure reducing valves on each makeup water system provided. Each hydronic system shall have a separate pressure reducing valve.

10-11 SPECIALIZED EXHAUST SYSTEMS. Provide vehicle exhaust systems for all repair bays and the engine/transmission shop. Provide welding exhaust systems in welding shop, body shop and all areas designated for welding.

10-11.1 Vehicle exhaust. Provide a hanging exposed overhead type vehicle tail pipe exhaust systems in all repair bays. Each system may serve a maximum of four bays. Location of ductwork shall be coordinated with lighting and equipment layout and overhead traveling cranes. Suitable flexible ducts with adapters to connect to tank exhaust (See Attachment #2 for additional information). Each duct shall have a slide damper or other means to prevent air from being exhausted when an operating vehicle is not connected. A separate exhaust system shall

be provided in the Engine/Transmission shop that is sized appropriately for the dynamometer. Construct and install all systems in accordance with applicable requirements of NFPA 91.

10-11.1.1 Fans. Fans shall be centrifugal non-overloading, non-sparking type. Internal and external protective coating shall be manufacturer's standard, engineered quality type, with properties comparable to air-dry or baked phenolic. Mount entire assembly on structural steel base with spring or elastomer type vibration isolators.

10-11.1.2 Ducts. Construct ducts and fittings with galvanized steel. Duct sheet metal gages shall conform to Class I in SMACNA RIDCSTD and SMACNA RIDCS. Construct suction side ductwork with lock groove seam longitudinal joints. Connect circumferential joints between sections with push-on or bead and crimp type, secured with a minimum 4 rivets or screws on ducts up to and including 4 inch diameter, and with screws or rivets a maximum 3 inches on center on larger sizes of duct. Lap joints in the direction of air flow. Solder all joints or construct ductwork leak-tight as for discharge side ductwork below. Construct ductwork on the discharge side of the fan leak-tight with joints and seams welded, brazed, or soldered. Provide flanges with suitable gaskets, where required. Repair damaged galvanizing with galvanizing repair compound.

10-11.1.3 Flexible Tail Pipe Exhaust Tubing and Connectors. Provide high temperature fabric/cloth type tubing with external coated helix. Tubing shall be flame, oil, and weather resistant. Connect to duct by screws or flanged joint with gasket. Connectors shall be provided to exhaust the various types of tanks and vehicles serviced with adapters or magnetic type attachment.

10-11.1.4 Supporting Elements. Support ducting with anti-sway bracing to resist perceptible movement in response to forces imposed by flexible tubing location on handling. Suspend tubing from overhead location and provide means to raise and lower for use.

10-11.2 Welding exhaust. Provide a point-of work welding exhaust system for the welding tables in the Welding Shop and the Body Shop. System shall have flexible neoprene or galvanized metal 5-inch hose providing 100 fpm exhaust at the point of fume generation with a minimum of 240 degree working range. Construct and install in accordance with applicable requirements of NFPA 91.Provide one portable welding exhaust system in the Welding Shop and the Body Shop. Portable systems shall include HEPA filtration for 1000 CFM and shall be provided complete with fan, 10 foot minimum 360 degree rotation arm, 8 inch diameter tubing, back wheels, front casters, foot brake, and extension cord.

10-11.2.1 Fans. Fans shall be centrifugal type. Internal and external protective coating shall be manufacturer's standard, engineered quality type, with properties comparable to air-dry or baked phenolic.

10-11.2.2 Ducts. Construct ducts and miter or stamped fittings with galvanized steel. Duct sheet metal gages shall conform to Class I in SMACNA RIDCSTD and SMACNA RIDCS. Construct suction side ductwork with lock groove seam longitudinal joints. Connect circumferential joints between sections with push-on or bead and crimp type, secured with a minimum 4 rivets or screws on ducts up to and including 100 mm diameter, and with screws or rivets a minimum 80 mm on center on larger sizes of duct. Lap joints in the direction of air flow. Solder all joints or construct ductwork leak-tight as for discharge side ductwork below. Construct ductwork on the discharge side of the fan leak-tight with joints and seams welded, brazed, or soldered. Provide flanges with suitable gaskets, where required. Repair damaged galvanizing with galvanizing repair compound.

10-12 PIPING SYSTEMS. Piping systems shall be in accordance with the following subparagraphs. Fittings and valves shall be compatible for the piping systems in which installed. Provide dielectric unions where required. Provide flexible connections where necessary to prevent vibrations from transmitting from equipment to the piping system. Expansion loops, expansion joints and offsets shall provide with adequate anchors and guides where required to prevent excessive forces within the piping systems. All piping shall be properly and adequately supported. Pipe supports shall conform to MSS SP-58 and MSS SP-69.

10-12.1 Chilled water. Shall be steel piping conforming to ASTM A 53/A 53M, Grade A or B, black steel, schedule 40 or copper tubing conforming to ASTM B 88, ASTM B 88M, Type K or L.

10-12.2 Hot water. Shall be steel piping conforming to ASTM A 53/A 53M, Type E or S, Grade A or B, black steel, schedule 40 or copper tubing conforming to ASTM B 88, ASTM B 88M, Type K or L.

10-12.3 Refrigerant. Copper tubing shall conform to ASTM B 280 annealed or hard drawn as required. Copper tubing shall be soft annealed where bending is required and hard drawn where no bending is required. Soft annealed copper tubing shall not be used in sizes larger than 1-1/4 inch. Refrigerant piping, valves, fittings, and accessories shall conform to the requirements of ASHRAE 15.

10-12.4 Condensate drain. Shall be copper tubing or PVC pipe.

10-13 INSULATION. Pipe and duct insulation shall be in accordance with ASHRAE 90.1. Equipment insulation shall be a minimum of 2 inches thickness or as necessary to prevent the surface temperature from exceeding 140 degrees F. Thermal insulation on piping, fittings, ductwork, equipment and vessels shall be installed per the "National Commercial & Industrial Insulation Standards" (MICA) Manual. The sample specification format in Section VI of the MICA manual shall be used and edited to suit the work to be performed.

10-13.1 Duct insulation. Provide on the exterior of all supply and outside air ducts and plenums and on all return ducts in unconditioned spaces. Exhaust and outdoor ventilation supply air ductwork does not require insulation. Insulation shall be faced with a vapor barrier material having a performance rating not to exceed 1.0 perm. Insulation, vapor barrier, and closure systems shall be non-combustible as defined in NFPA 255, with a flame-spread rating of not more than 25, and a smoke development rating of not more than 50, as defined in ASTM E-84. Where insulated ducts pass through fire walls, fire partitions, above grade floors, and fire rated chase walls, the penetration shall be sealed with fire stopping materials.

10-13.2 Pipe Insulation. Provide on all aboveground hot and cold piping systems except PVC condensate drains. Insulation shall form a continuous thermal retarder and shall have a vapor retardant to prevent condensation on cold piping systems. Installation shall be with full length units of insulation and using a single cut piece to complete a run. Cut pieces or scraps abutting each other shall not be used. Supply the insulation with manufacturers recommended factory applied jacket except for flexible cellular. Piping exposed to weather shall be insulated and an aluminum jacket or PVC jacket shall be applied. Where insulated pipes pass through fire walls, fire partitions, above grade floors, and fire rated chase walls, the penetration shall be sealed with fire stopping materials.

10-13.2.1 Cold aboveground piping. Insulation for minus 30 degrees to plus 60 degrees F for outdoor, indoor, exposed or concealed applications, shall be as follows:

10-13.2.2 Cellular Glass: ASTM C 552, Type II, and Type III.

10-13.2.3 Flexible Cellular Insulation: ASTM C 534, Type I or II with vapor retarder skin on both sides.

10-13.2.4 Phenolic Insulation: ASTM C 1126, Type III.

10-13.2.5 Polyisocyanurate Insulation: ASTM C 591, Type I.

10-13.3 Hot aboveground piping. Insulation for above 60 degrees F for outdoor, indoor, exposed or concealed applications, shall be as follows:

10-13.3.1 Mineral Fiber: ASTM C 547, Types I, II or III.

10-13.3.2 Calcium Silicate: ASTM C 533, Type I indoor only, or outdoors above 250 degrees F pipe temperature.

10-13.3.3 Cellular Glass: ASTM C 552, Type II and Type III.

10-13.3.4 Flexible Cellular Insulation: ASTM C 534, Type I or II to 200 degrees F service.

10-13.3.5 Phenolic Insulation: ASTM C 1126 Type III to 250 degrees F service shall comply with ASTM C 795. Supply with manufacturer's recommended factory applied jacket.

10-13.3.6 Polyisocyanurate Insulation: ASTM C 591, Type 1, to 300 degrees F service. Supply with manufacturer's recommended factory applied jacket.

10-13.4 Equipment. Provide on all equipment when temperatures are below 60 degrees F, above 105 degrees F or where condensation can occur. Insulation shall be suitable for the temperature encountered. Insulation shall be formed or fabricated to fit the equipment. Removable insulation sections shall be provided to cover parts of equipment which must be opened periodically for maintenance including vessel covers, fasteners, flanges and accessories. Supply the insulation with manufacturer's recommended factory applied jacket.

10-14 CONTROLS. Control system shall be DDC. Pneumatic actuators for automatic valves, dampers and similar will not be allowed. Provide all devices required, including current transducers, transformers, thermostats, sensors, controllers, actuators, control valves, dampers, transmitters, flow meters, etc., to provide a complete and operable system. All thermostats for systems that provide both heating and cooling shall have a deadband of 5 degrees F. All equipment and systems shall be automatically controlled and monitored by the control system. Control system instructions shall be provided for each system. The instructions shall consist of half-size laminated drawings and shall include the control system schematic, equipment schedule, ladder diagram, sequence of operation, panel arrangement drawings, wiring diagram, and valve and damper schedules.

10-15 TESTING, ADJUSTING AND BALANCING. Testing, adjusting and balancing of each system shall be the Contractor's responsibility. Testing and balancing of air and hydronic systems shall be accomplished by a firm certified for testing and balancing by the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Prior to testing, adjusting, and balancing, the Contractor shall verify that the systems have been properly installed and are operating as specified. Testing of individual items of equipment shall

be performed by a person authorized to perform such testing and startup by the equipment manufacturer. The contractor shall correct all systems and equipment not found in compliance, and shall be responsible for all labor and materials required for this effort. AABC MN-1 or NEBB-01 shall be used as the standard for providing testing of air and water systems. The selected standard shall be used throughout the entire project. All recommendations and suggested practices contained in the selected standard shall be considered mandatory. Instrumentation accuracy shall be in accordance with selected standard. The provisions of the TAB standard, including checklists, report forms, etc., shall, as nearly as practical, be used to satisfy the Contract requirements.

10-15.1 Piping systems. Each piping system including pipe, valves, fittings and equipment shall be hydrostatically tested and proved tight at a pressure of 1-1/2 times the design working pressure, but not less than 100 psi for a period of not less than two hours with no appreciable loss in pressure. Piping shall not be insulated until testing is completed and acceptable. Upon completion of installation and prior to startup, each hydronic system shall be balanced. All balancing data, including deficiencies encountered and corrective action taken, shall be recorded. Following final acceptance of certified reports by the Contracting Officer, the setting of all HVAC adjustment devices shall be permanently marked by the Contractor's balancing engineer so that adjustment can be restored if disturbed at any time.

10-15.2 Air systems. Where specific systems require special or additional procedures for testing, such procedures shall be in accordance with the standard selected. All data, including deficiencies encountered and corrective action taken, shall be recorded. Following final acceptance of certified reports by the Contracting Officer, the setting of all HVAC adjustment devices shall be permanently marked by the Contractor's balancing engineer so that adjustment can be restored if disturbed at any time.

10-15.3 Equipment. Equipment. Each item of central operating equipment provided, including boilers, air handling units, and chillers shall be tested in accordance with the equipment manufacturer's standard testing procedures. A factory representative shall be present for the startup and testing of each item of equipment. A certified report shall be provided for each item of equipment tested.

10-16 COMMISSIONING. All HVAC systems and equipment including controls shall be commissioned in accordance with the following Clauses 5 (Program-Phase Procedure), 6 (Design Phase), 7 (Construction Phase), 8 (Acceptance Phase) and 12 (Commissioning Documentation) in ASHRAE Guideline 1. The Commissioning Authority (CA), referenced in ASHRAE Guideline 1, shall be hired by the prime Contractor. The CA shall be completely independent from the Contractor and shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. The roles and responsibilities of the CA are defined in Annex A DIVISION 15 PART 1 Paragraph 1.03 (B.) and shall become part of the contract requirements. Clause 6.2.3 makes reference to Appendix A6.4 for a sample commissioning specification which shall become part of the contract requirements and shall be edited to suit the work to be performed. The CA must meet the following qualifications:
1. Be employed by an AABC or NEBB certified firm.
2. Hold a management position in the firm, be able to represent the firm on all HVAC commissioning matters, and have a reputation of integrity with building owners, consultants and awarding authorities. The CA must have experience equal to either of the following;
a. A Bachelor of Science engineering degree from an accredited college or university with a least four (4) years of experience in HVAC installation or HVAC design work, or

b. A minimum of ten (10) years experience in any (or combination) of the following HVAC testing-adjusting-balancing, HVAC installation, HVAC design work or HVAC technical education with a minimum of four (4) years Project Responsibility.
3. Become NEBB or AABC qualified and/or maintain NEBB or AABC qualification as a TAB supervisor for both AIR and HYDRONIC systems by passing appropriate written and practical TAB examinations.
4. Demonstrate Knowledge in the category or categories of HVAC commissioning.

10-17 TRAINING. The Contractor shall conduct a training course for the operating for all HVAC operating systems and individual items of equipment. The training program shall be conducted in accordance with Clause 11, Operations and Maintenance Training Program, in ASHRAE Guideline 1 in addition to the following requirements. The field instructions shall cover all of the items of equipment provided as well as the overall systems. The training period shall consist of a total of 8 hours of normal working time and shall start after the systems are functionally completed and testing, adjusting and balancing have been completed. Factory representatives shall be present to assist in training for every item of operating equipment provided. Contractor shall provide two copies of operation and maintenance instructions for each item of equipment provided. Training shall consist of startup, normal operation and shutdown, as well as demonstrations of routine maintenance operations. The Contracting Officer shall be notified at least 14 days prior to date of proposed conduction of the training course.

CHAPTER 11

ENERGY CONSERVATION

11-1 **ENERGY RECOVERY EQUIPMENT**.

11-1.1 Plate heat exchangers. Unit shall be a factory fabricated and tested assembly for stationary air-to-air energy recovery by transfer of sensible heat from exhaust air to supply air stream. Heat transfer surface shall be constructed of aluminum. Enclosure shall be fabricated from galvanized steel and shall include maintenance access provisions.

11-1.2 Rotary heat exchangers. Unit shall be a factory fabricated and tested assembly for air-to-air energy recovery by transfer of sensible heat from exhaust air to supply air stream. Device performance shall be according to ASHRAE 84. Exchange media shall be chemically inert, moisture-resistant, fire-retardant, laminated, nonmetallic material which complies with NFPA 90A. Exhaust and supply streams shall be isolated by seals which are static, field adjustable, and replaceable. Chain drive mechanisms shall be fitted with ratcheting torque limiter or slip-clutch protective device. Enclosure shall be fabricated from galvanized steel and shall include maintenance access provisions.

11-1.3 Heat recovery coils. Coil assembly shall be factory fabricated and tested air-to-liquid-to-air energy recovery system for transfer of sensible heat from exhaust air to supply air stream. System shall deliver an energy transfer effectiveness without cross-contamination with maximum energy recovery at minimum life cycle cost. Components shall be computer optimized for capacity, effectiveness, number of coil fins per mm, number of coil rows, flow rate and frost control. Coils, pumps, controls and piping materials shall conform to Chapter 10 – HVAC.

11-1.4 Heat pipe. Device shall be a factory fabricated, assembled and tested, counterflow arrangement, air-to-air heat exchanger for transfer of sensible heat between exhaust and supply streams. Device shall deliver an energy transfer effectiveness without cross-contamination. Heat exchanger tube core shall be seamless aluminum or copper tube with extended surfaces, utilizing wrought aluminum Alloy 3003 or Alloy 5052, temper to suit. Tubes shall be fitted with internal capillary wick, filled with an ASHRAE 15, Group 1 refrigerant working fluid, selected for system design temperature range, and hermetically sealed. Heat exchanger frame shall be constructed of not less than 16 gauge galvanized steel and fitted with intermediate tube supports, and flange connections. Tube end-covers and a partition of galvanized steel to separate exhaust and supply air streams without cross-contamination and in required area ratio shall be provided. A drain pan constructed of welded Type 300 series stainless steel shall be provided. Heat recovery regulation shall be provided by system face and bypass dampers and related control system as indicated interfacing with manufacturer's standard tilt-control mechanism for summer/winter operation, regulating the supply air temperature and frost prevention on weather face of exhaust side at temperature indicated. Coil shall be fitted with pleated flexible connectors.

11-1.5 Pretreatment of Outside Air. Dessicant cooling and other methods should be considered for pretreatment of outside air.

11-2 **REBATES AND INCENTIVES**. Systems and techniques which take advantage of rebates and incentives offered by utilities are preferred.

CHAPTER 12

FIRE PROTECTION

12-1 **DESIGN STANDARDS AND CODES**. The fire protection design for all facilities shall be in accordance with the current versions of the International Building Code and the National Fire Protection Association (NFPA) standards and codes.

12-1.1 **Fire Protection Engineer**. The contractor shall provide the services of a qualified registered fire protection engineer. The fire protection engineer shall be an integral part of the design team and shall be involved in all aspects of the design of the fire protection system.

12-1.2 **Fire Protection and Life Safety Analysis**. The fire protection engineer shall perform a fire protection and life safety design analysis of the proposed facility design. The analysis shall be submitted with the preliminary design submittal. The analysis shall include type of construction; height and area limitations; classification of occupancy; building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire-rated walls, doors, fire dampers, etc.; analysis of automatic suppression systems and protected areas; water supplies; fire alarm system, including connection to the base-wide system; fire detection system; fire extinguishers; interior finish ratings; and other pertinent fire protection data. The submittal shall include a life safety floor plan showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, sprinklered areas, fire extinguisher locations, ratings of fire-resistive assemblies, and other data necessary to exhibit compliance

12-2 **HYDRANT FLOW DATA**.

12-2.1 Proposed design shall be based on test data as described below.

Flow Data:

Date and Location of Test: May 16, 2003 – Hydrant at corner 8th Street and Rives Road.
Static Pressure Measured: 50 psig
Residual Pressure of: 40 psig Flowing 1060 gpm

AWAITING DATA FROM FT PICKETT ON WATER SYSTEM FLOW TEST RESULTS

12-2.2 The contractor shall provide detailed calculations which demonstrate that the systems designed meet the flow demands of the sprinkler systems within the facility and the fire department hose stream requirements from the fire hydrants.

12-3 **SPRINKLER SYSTEM**.

12-3.1 Wet pipe sprinkler system. All new facilities constructed in this project shall be protected by a wet pipe sprinkler system except that sprinklers may be omitted from small detached buildings of less than 5000 square feet which are separated by more than 50 ft in distance from any other buildings. Sprinkler system shall be designed and installed in accordance with the provisions of NFPA 13, Standard for the Installation of Sprinkler Systems. Provide hydraulic calculations to support design of the system. Sprinkler systems shall be hydraulically designed to discharge the following minimum density over the hydraulically most demanding 3000 square feet of floor area in the following locations:

a. Maintenance Bays including Paint Bays: 0.25 gpm/ft^2
b. POL Storage Areas: 0.40 gpm/ft^2
c. Office and Admin Areas: 0.10 gpm/ft^2
d. All other areas: 0.20 gpm/ft^2

12-3.2 Dry pipe sprinkler system. Provide dry pipe sprinkler system for unheated storage building “E”. Sprinkler system shall be designed and installed in accordance with the provisions of NFPA 13, Standard for the Installation of Sprinkler Systems. Provide hydraulic calculations to support design of the system. Dry pipe systems shall be hydraulically designed to discharge the following minimum density over the hydraulically most demanding 362 square meter of floor area in the following locations:

a. Building “E”: 0.15 gpm/ft^2

12-3.3 Sprinkler Heads. All sprinkler heads located in finished areas shall be recessed pendent type.

12-3.4 Covered loading docks shall be fully sprinkled by a suitable sprinkler system.

12-4 BUILDING CONSTRUCTION. Comply with requirements of International Building Code and NFPA 101Life Safety Code.

12-4.1 Fire Extinguishers and Cabinets. Contractor’s design shall indicate fire extinguisher requirements. Government will provide portable fire extinguishers in accordance with NFPA 10. Government will provide bracket-mounted extinguishers in non-core areas. Provide semi-recessed aluminum fire extinguisher cabinets with clear view panel in core areas. Provide fire-rated cabinets in fire-rated wall assemblies.

12-4.1.1 Interior Wall and Ceiling Finishes. Wall and ceiling finishes and movable partitions shall conform to the requirements of the IBC and NFPA 101, except as follows:

12-4.1.2 Interior finish for exits, and exit passageways shall be Class A only.

12-4.1.3 Flame spread (FS) and smoke development (SD) shall be tested in accordance with IBC requirements. Class C materials shall only be permitted in fully sprinklered buildings.

12-4.1.4 Cellular plastics shall not be used as interior wall and ceiling materials.

12-4.1.5 Carpeting and other textile wall coverings shall not be applied as an interior finish.

12-5 FIRE ALARM. Provide fire alarm system conforming to requirements of NFPA 72, NFPA 101, ADA, UFAS and UFC 3-600-01, Fire Protection Engineering for Facilities. Coordinate system requirements with the Fort Pickett Fire Chief. Fire alarm system shall consist of pull stations, audiovisual signal devices, control/annunciation panel and tamper and/or flow connection/supervision to the sprinkler system. Provide duct smoke detectors where required by NFPA 90. Fire alarm system shall be the analog addressable type that will provide identification of each installed field device. The system shall be UL listed for this application. Control units for which proprietary laptop programming is required and factory certified training, programming software and job specific program files that are not made available to the end customer are not allowed. Provide supervision of fire pump where fire pump is provided.

12-5.1 Provide fire reporting radio transmitter compatible with the existing Fort Pickett central fire reporting system. Connect and program the transmitter and Fire Station receiver to communicate and report fire by zone.

12-5.2 After completion of installation of the fire alarm system, turn over to DPW at no additional cost the following complete documentation:

Installation Manual
Programming Manual
Programming Software
System As-Built Drawings

CHAPTER 13

CONTRACTOR PREPARED SPECIFICATIONS

13-1. The successful offeror shall prepare a specification for all work included in the scope of work. The specification shall be tailored to this job. Inapplicable materials shall be deleted. Any reference, description, procedure or other matter required to develop a complete, accurate and concise specification shall be provided. The specification shall include but is not limited to:

13-1.1. A description of the technical requirements

13-1.2. Criteria for determining whether the requirements are met

13-1.3. Quality control requirements and procedures

13-2 Specifications for features of the work shall be organized into divisions and sections in accordance with Construction Specifications Institute (CSI), Master List of Titles and Numbers for the Construction Industry, latest edition.

13-3 Individual specification sections shall be in the format of CSI, Section Format, A Recommended Format for Construction Specification Sections, latest edition. Exceptions are:

13-3.1. Except as otherwise noted in this paragraph, CONTRACTOR PREPARED SPECIFICATIONS, the paragraph SUMMARY shall not be used.

13-3.2 Submittal requirements, submittal procedures and quality control procedures, construction operations shall be those contained in the attached Section 01005, Section 01012, Section 01111, Section 1200, Section 1312, Section 1321N, Section 01330, Section 1355, Section 1451A, Section 1500, Section 1572, Section 1670, Section 1720, Section 1780, and Section 1850, Section 02220 and Section 13286. These specification sections shall be incorporated into the contractor prepared specification packages without editing and shall be coordinated with all other specification sections prepared by the contractor.

13-4 Removal and disposal of asbestos shall be specified in its own section and numbered 13280A. The attached section 13280A shall be reviewed, edited, and submitted by the Contractor's designated qualified designer licensed for asbestos design in the Commonwealth of Virginia during the design review process. Specification shall be edited to suit this particular project requirements as determined by the contractor's professional staff.

13-5 Removal and disposal of lead based paint, shall be specified in its own section and numbered 13281A. The attached section 13281A shall be reviewed, edited, and submitted by the Contractor's qualified designer licensed for lead design in the Commonwealth of Virginia during the design review process. Specification shall be edited to suit this particular project requirements as determined by the contractor's professional staff.

13-6 Removal and disposal of lighting ballasts and lamps containing PCBs and Mercury, shall be specified in its own section and numbered 13286N. The attached section 13286N shall be reviewed, by the Contractor's Industrial Hygienist during the design development process. Specification shall not be edited and shall be included into the design specifications prepared by the Designers of Record.

13-8 Contractor prepared specifications shall be reviewed by the Contracting Officer or his designated representatives during the design portion of the project. Contractor will incorporate all required changes after resolution of comments and prior to work initiation on the next phase of the project.

APPENDIX A

REFERENCES

GOVERNMENT PUBLICATIONS:

Commonwealth of Virginia

Virginia Administrative Code Available at http://leg1.state.va.us	TITLE 9 – ENVIRONMENT Agency 20 – Virginia Waste Management Board Agency 25 – State Water Control Board

UNITED STATES GOVERNMENT

Code of Federal Regulations Government Printing Office Washington, DC 20402	49 CFR 192 Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards 49 CFR 195 Transportation of Hazardous Liquids by Pipeline 40 CFR 280 Owners and Operators of Underground Storage Tanks 10 CFR 430 Energy Conservation Program for Consumer Products
Department of Defense	DoD Antiterrorism Standards for Buildings, DRAFT version, dated 25 January 2002
Department of the Navy	
Standardization Documents Order Desk 700 Robbins Avenue, Bldg. 4D Philadelphia, PA 19111-5094	MIL-HDBK-1008, Fire Protection for Facilities Engineering, Design, and Construction
U.S. Government Printing Office	
Superintendent of Documents U.S. Government Printing Office Washington, DC 20402	U.S. Government Printing Office (GPO) Style Manual

NON-GOVERNMENT PUBLICATIONS:

Air Conditioning and Refrigeration Institute
4301 North Fairfax Drive
Arlington, VA 22203

ARI 310/380 (1993) Packaged Terminal Air-Conditioners and Heat Pumps
ARI 410 (1991) Forced-Circulation Air-Cooling and Air-Heating Coils

ARI 430 (1989) Central-Station Air-Handling Units

ARI 440 (1998) Room Fan-Coil and Unit Ventilator

ARI 445 (1987; R 1993) Room Air-Induction Units

ARI 550/590 (1998; Addendum June 1999) Water-Chilling Packages Using the Vapor Compression Cycle;

ARI 700 (1999) Specifications for Fluorocarbons and Other Refrigerants

ARI 880 (1998) Air Terminals

ARI 1010 (1994) Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers

Air Movement and Control Association
30 W. University Drive
Arlington Heights, IL 60004-1893

AMCA 210 (1985) Laboratory Methods of Testing Fans for Rating

American Architectural Manufacturers Association (AAMA)
1827 Walden Office Square, Suite 104
Schaumburg, IL 60173-4268

AAMA 101 Voluntary Specifications for Aluminum, Vinyl and Wood Windows and Glass Doors

AAMA 605 Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

	AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
	AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
American Bearing Manufacturers Association 1200 19th Street, NW Washington, DC 20036-4303	AFBMA Std 9 (1990) Load Ratings and Fatigue Life for Ball Bearings
	AFBMA Std 11 (1990) Load Ratings and Fatigue Life for Roller Bearings
American Boiler Manufacturers Association (ABMA) 950 N. Glebe Rd, Suite 160 Arlington, VA 22203-1824	ABMA ISEI Industry Standards and Engineering Information
American National Standards Institute 11 West 42 Street New York, NY 10036	ANSI 70 (1996) National Electrical Code
	ANSI B16.3 (1998) Malleable Iron Threaded Fittings Classes 150 and 300
	ANSI C2 (1997) National Electrical Safety Code
	ANSI Z21.10.1 (1993; Z21.10.1a; Z21.10.1b; Z21.10.1c) Gas Water Heaters Vol. I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less
	ANSI Z21.13 (1991; Addenda 1993 and 1994) Gas-Fired Low-Pressure Steam and Hot Water Boilers
	ANSI Z21.45 (1995) Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
	ANSI Z21.47 (1998) Gas-Fired Furnaces
	ANSI Z83.6 (1990; Addenda 1992 and

	1993) Gas-Fired Infrared Heaters
	ANSI Z124.3 (1995) American National Standard for Plastic Lavatories.
	ANSI Z124.6 (1997) Plastic Sinks
	ANSI/TIA/EIA-569-A (1998) Commercial Building Standard for Telecommunications Pathways and Spaces
American Society of Plumbing Engineers 3617 E. Thousand Oaks Blvd. Westlake Village, CA 91362	Volume 1 (1998) Fundamentals of Plumbing Engineering
American Society for Testing and Materials 100 Bar Harbor Drive West Conshohocken, PA 19428-2959	ASTM A 36/A 36M (2000) Carbon Structural Steel
	ASTM A 53 (1999) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
	ASTM A 106 (1999) Seamless Carbon Steel Pipe for High-Temperature Service
	ASTM A 134 (1996) Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
	ASTM A 135 (1997c) Electric-Resistance-Welded Steel Pipe
	ASTM A 139 (1996el) Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and over)
	ASTM B 75 (1999) Seamless Copper Tube
	ASTM B 88 (1999) Seamless Copper Water Tube
	ASTM B 280 (1999) Seamless Copper

Tube for Air Conditioning and Refrigeration Field Service

ASTM B 395 (1995) U-Bend Seamless Copper and Copper Alloy Heat Exchanger and Condenser Tubes

ASTM B 395M (1995) U-Bend Seamless Copper and Copper Alloy Heat Exchanger and Condenser Tubes (Metric)

ASTM C 518 (1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM C 533 (1995) Calcium Silicate Block and Pipe Thermal Insulation

ASTM C 534 (1999) Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

ASTM C 547 (1995) Mineral Fiber Pipe Insulation

ASTM C 552 (2000) Cellular Glass Thermal Insulation

ASTM C 591 (1994) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

ASTM C 795 (1992; R 1998el) Thermal Insulation for Use in Contact With Austenitic Stainless Steel

ASTM C 1126 (1998) Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation

ASTM D 1248 (1998) Polyethylene Plastics Molding and Extrusion Materials

ASTM D 1784 (1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds

	and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
	ASTM D 1785 (1996b) Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
	ASTM D 2241 (1996b) Poly(Vinyl Chloride) (PVC) Pressure-Rated-Pipe (SDR Series)
	ASTM D 2310 (1997) Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
	ASTM D 2513 (1999; Rev. A) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
	ASTM D 2683 (1998) Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
	ASTM D 2846/D 2846M (1999) Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
	ASTM D 2996 (1996; Rev. A) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
	ASTM D 5686 (1995) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Pipe Fittings, Adhesive Bonded Joint Type Epoxy Resin, for Condensate Return Lines
	ASTM E84 (2000) Surface Burning Characteristics of Building Materials
American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tully Circle. NE Atlanta, GA 30329-2305	ASHRAE 15 (1994; Errata 1994; Addendum 15C-2000) Safety Code for Mechanical Refrigeration

	ASHRAE 34 (1997) Number Designation and Safety Classification of Refrigerants
	ASHRAE 52.1 (1992) Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
	ASHRAE 64 (1995) Methods of Testing Remote Mechanical-Draft Evaporative Refrigerant Condensers
	ASHRAE 84 (1991) Method of Testing Air-to-Air Heat Exchangers
	ASHRAE 90.1 (2001) Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings
	ASHRAE Hdbk-IP (2001) Handbook, Fundamentals I-P Edition
American Society of Mechanical Engineers International Three Park Place New York, NY 10016-5990	ASME A112.19.1 (1994, Supp.1998) Enameled Cast Iron Plumbing Fixtures
	ASME A112.19.2 (1998) Vitreous China Plumbing Fixtures
	ASME A112.19.3 (1996) Stainless Steel Plumbing Fixtures
	ASME A112.19.4 (1998) Porcelain Enameled Formed Steel Plumbing Fixtures
	ASME B16.5 (1996; Addenda 1998) Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24
	ASME B16.9 (1993) Factory Made Wrought Steel Buttwelding Fittings
	ASME B16.11 (1996) Forged Fittings, Socket-Welding and Threaded
	ASME B16.22 (1995; B16.22a1998) Wrought Copper and Copper Alloy Solder

	Joint Pressure Fittings
	ASME B16.26 (1988) Cast Copper Alloy Fittings for Flared Copper Tubes
	ASME B31.1 (1998; Addenda 1999 and 2000) Power Piping
	ASME B31.8 (1995) Gas Transmission and Distribution Piping Systems
	ASME BPVC SEC IV PT HLW (1995; Addenda 1995, 1996, and 1997) Boiler and Pressure Vessel Code Section IV Part HLW Potable-Water Heaters
	ASME BPVC SEC VII (1995; Addenda 1995, 1996, and 1997) Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
	ASME CSD-1 (1998) Controls and Safety Devices for Automatically Fired Boilers
Architectural Woodwork Institute 1952 Isaac Newton Square W. Reston, VA 20190	AWI Quality Standards (1999) 7th Edition, Version 1.2
Associated Air Balance Council 1518 K Street NW, Suite 708 Washington, DC 20005	AABC MN-1 (1989) National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
Builders Hardware Manufacturers Association 355 Lexington Ave, Suite 1700 New York, NY 10017-6603	ANSI/BHMA A156.4 (2000) American National Standards for Door Controls - Closers…
Council of American Building Officials 5203 Leesburg Pike, Suite 708 Falls Church, VA 22041	CABO A117.1 (1992; Errata Jun 1993) Accessible and Usable Buildings and Facilities

Electronic Industries Association (EIA) 2500 Wilson Blvd Arlington, VA 22201-3834	EIA/TIA 568-B (2001) Commercial Building Telecommunications Cabling Standards
	EIA/TIA 569-A (2001, amendment 5) Commercial Building Standard for Telecommunications Pathways and Spaces
Illuminating Engineering Society of North America 120 Wall Street, 17th Floor New York, NY 10005-4001	IESNA RP-8 (1983; R 1993) Roadway Lighting
	IES LHBK (1993) Lighting Handbook, Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE) 445 Hoes Lane, P.O. Box 1331 Piscataway, NJ 08855-1331	Standard for Use of the International System of Units (SI): the Modern Metric System
International Approval Services (IAS) 8501 E. Pleasant Valley Rd Cleveland, OH 44131	IAS Directory (1999) IAS Directory of AGA & CGA Certified Appliances and Accessories
International Association of Plumbing and Mechanical Officials 20001 Walnut Drive South Walnut, CA 91789-2825	IAPMO Z124.1 (1995) Plastic Bathtub Units
	IAPMO Z124.3 (1995) Plastic Lavatories
	IAPMO Z124.5 (1997) Plastic Toilet (Water Closets) Seats
	IAPMO Z124.9 (1994) Plastic Urinal Fixtures
International Code Council, Inc. 5203 Leesburg Pike, Suite 708 Falls Church, VA 22041-3401	ICC (2000) International Building Code
	ICC (2000) International Plumbing Code
	ICC (2000) International Mechanical Code
International Conference of Building	ICBO (1997) Uniform Building Code

Officials
5360 Workman Mill Road
Whittier, CA 90601-2298

Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) 127 Park St., NE Vienna, VA 22180-4602	MSS SP-58 (1993) Pipe Hangers and Supports - Materials, Design and Manufacture MSS SP-69 (1996) Pipe Hangers and Supports - Selection and Application
National Association of Corrosion Engineers International 1440 South Creek Drive Houston, TX 77084-4906	NACE RP0169 (1996) Control of External Corrosion on Underground or Submerged Metallic Piping Systems NACE RP0185 (1996) Extruded, Polyolefin Resin Coating Systems with Soft Adhesives for Underground or Submerged Pipe
National Association of Plumbing - Heating – Cooling Contractors 180 S. Washington Street Falls Church, VA 22046	NAPHCC Plumbing Code (1996) National Standard Plumbing Code
National Electrical Manufacturers Association 1300 N 17th Street, Suite 1847 Rosslyn, VA 22209	NEMA C12.1 (1995) Code for Electricity Metering NEMA LD3 High Pressure Decorative Laminates NEMA PB 1 (1995) Panelboards
National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877-4121	NEBB Procedural Stds (1991) Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association One Batterymarch Park Quincy, MA 02269-9101	NFPA 10 (1998) Standard for Portable Fire Extinguishers NFPA 13 (1999) Installation of Sprinkler Systems

	NFPA 20 (1999) Installation of Stationary Pumps for Fire Protection
	NFPA 30 (2000) Flammable and Combustible Liquids Code
	NFPA 31 (2001; TIA 97-11) Installation of Oil Burning Equipment
	NFPA 54 (1999) National Fuel Gas Code
	NFPA 58 (2001) Liquefied Petroleum Gas Code
	NFPA 70 (2002) National Electrical Code
	NFPA 72 (1999) National Fire Alarm Code
	NFPA 80 (1999) Fire Doors and Fire Windows
	NFPA 85 (2001) Boiler and Combustion Systems Hazards Code
	NFPA 90A (1999) Installation of Air Conditioning and Ventilating Systems
	NFPA 91 (1999) Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
	NFPA 101 (2000) Life Safety Code
	NFPA 211 (2000) Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
	NFPA 214 (2000) Water-Cooling Towers
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45 Bristol Drive, Suite 101 South Easton, MA 02375	Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
	PDI WH201 (1992) Water Hammer Arrestors
Sheet Metal and Air Conditioning Contractor's National Association PO Box 221230 Chantilly, VA 20153-1230	SMACNA HVAC Duct Construction Standards (1995; Addenda Nov 1997)) HVAC Duct Construction Standards - Metal and Flexible
	SMACNA Arch. Manual (1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual
	SMACNA RIDCSTD (1977) Round Industrial Duct Construction Standards
	SMACNA RIDCS (1980) Rectangular Industrial Duct Construction Standards
Steel Door Institute (SDI) 30200 Detroit Road Cleveland, OH 44145-1967	ANSI A250.8/SDI 100 Standard Steel Doors and Frames
Steel Tank Institute (STI) 570 Oakwood Rd Lake Zurich, IL 60047	STI P3 Underground Steel Storage Tank Protection
Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062-2096	UL 174 (1996; Rev thru Oct 1999) Household Electric Storage Tank Water Heaters
	UL 181 (1996; Rev Dec 1998) Factory-Made Air Ducts and Air Connectors
	UL 296 (1994; Rev Sep 1998) Oil Burners
	UL 430 (1994; Rev thru Nov 1996) Waste Disposers
	UL 441 (1996; Rev Dec 1999) Gas Vents
	UL 507 (1999) Electric Fans

UL 555 (1999) Fire Dampers

UL 567 (1996; Rev thru Oct 1997) Pipe Connectors for Petroleum Products and LP-Gas

UL 608 Modular Vault Panels

UL 641 (1995; Rev Apr 1999) Type L, Low-Temperature Venting Systems

UL 705 (1994; Rev thru Feb 1999) Power Ventilators

UL 726 (1995; Rev thru Jan 1999) Oil-Fired Boiler Assemblies

UL 732 (1995; Rev thru Jan 1999) Oil-Fired Storage Tank Water Heaters

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UL 795 (1999) Commercial-Industrial Gas Heating Equipment

UL 900 (1994; Rev thru Nov 1999) Test Performance of Air Filter Units

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UL 1738 (1993; Rev thru Mar 1998) Venting Systems for Gas-Burning Appliances, Categories II, III and IV

UL 1746 (1993; Rev thru Sep 1998) External Corrosion Protection Systems for Steel Underground Storage Tanks

UL 1995 (1995; Rev thru Aug 1999) Heating and Cooling Equipment